

FREIGHT PLANNING AND THE METROPOLIS: THE ROLE OF METROPOLITAN  
PLANNING ORGANIZATIONS IN REGIONAL FREIGHT TRANSPORTATION  
PLANNING

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A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in  
partial fulfillment of the requirements for the degree of Doctor of Philosophy in the  
Department of City and Regional Planning

Chapel Hill  
2015

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## ABSTRACT

MARC ALAN HOWLETT: Freight Planning and the Metropolis: The Role of Metropolitan Planning Organizations in Regional Freight Transportation Planning  
(Under the direction of Daniel Rodríguez)

The efficient and reliable movement of goods undergirds the United States economy, yet the freight transportation network faces increasing threats from congestion, aging infrastructure, and limited public funds. Addressing these challenges is complicated by the multimodal nature of freight transportation and the direct involvement of public sector, private sector, quasi-governmental and non-profit organizations. One policy response has focused on strengthening the freight planning of metropolitan planning organizations (MPOs), the federally mandated entities responsible for transportation planning in metropolitan regions. Despite policies to bolster MPO freight planning, numerous studies indicate that overall MPO freight planning capacity is low although select MPOs maintain robust freight planning programs.

This dissertation examines the role of MPOs in regional freight planning and seeks to better understand variations in MPO freight planning capacity. The study focuses on two potential explanations for these variations: 1) the effects of federal policy, and 2) the effects of multisector freight stakeholder organizations in the regional context of freight planning. The literatures on freight planning, organizational capacity, federal transportation policy, and urban regime theory provide the theoretical foundations for this examination. The study employs a sequential mixed methods research design with a national survey of MPO freight planning with subsequent freight planning case studies in four regions.

Analysis of survey data confirms previous research that overall MPO freight planning capacity remains low with some exceptions. Regression discontinuity models show minimal effect of federal policy to explain variations in MPO freight planning capacity. Case study findings demonstrate the importance of regional freight stakeholders from multiple sectors to support, and in certain instances substitute, MPO freight planning activities. The case studies also underscore the centrality of state departments of transportation in the planning efforts of MPOs. The dissertation concludes with avenues for future research and discusses the policy implications of this research, implications that are particularly relevant given the uncertain future of transportation policy in the United States.

For Laurie, Ezra and our family.

## ACKNOWLEDGEMENTS

My heartfelt thanks and gratitude goes out to Dr. Daniel Rodríguez who served as my advisor and mentor at the University of North Carolina at Chapel Hill. I grew enormously as an academic, professional, and person during my doctoral studies and Daniel's guidance was integral to that growth. I am grateful to have Daniel as my PhD advisor and mentor.

I am very thankful for the support, encouragement, and critiques of my dissertation committee members, Dr. Noreen McDonald, Dr. Nikhil Kaza, Dr. Steve Appold, and Dr. Rachel Willis. I took my first transportation course with Noreen, and the intellectual rigor with which she approached the material contributed in large part to my pursuit of a PhD in City and Regional Planning. I benefited immensely from Nikhil's combination of expertise in planning theory and quantitative analysis. Steve helped push me along from the first time I met him when I wandered into his office on the other side of campus to years later at my dissertation defense, even if my path between those points was not exactly linear. Rachel not only helped guide my dissertation to completion but also helped guide me to a visit to the Panama Canal with an international group of maritime engineers.

My dissertation research relied on the graciousness of many hundreds of professionals in transportation and other fields who volunteered their time by completing my survey, talking with me in person, answering my e-mails, and offering me guidance. I am humbled by the generosity of others.

My fellow PhD students in the Department of City and Regional Planning provided much-needed support and friendship during the long doctoral process. I am taking some

liberties with defining a cohort, but I very much appreciate sharing this experience with Hye-Sung Han, Ward Lyles, Augustus Anderson, Mary Donegan, Tab Combs, Danielle Spurlock, and Louis Merlin.

The Writing Center and The Learning Center were central to my time as a doctoral student. I am especially grateful for the support and guidance of Dr. Kim Abels and Dr. Vicki Behrens. The Learning Center helped me tremendously in growing as a professional and completing my dissertation. Dr. Theresa Maitland served as my primary academic coach during my final twelve months as a PhD student where I went from still needing to collect data to being completely finished. I am so thankful for all of my Learning Center friends and colleagues, Kristen Rademacher, Robin Blanton, Billie Shambley, Christina Perry, and Dr. Bob Pleasants.

I met many of my friends and fellow students through the Writing Center and Learning Center. I am thankful for the friendship of Anne Berler, Jill Peterfeso, Brandon Sams, Brandi Denison, Ben Shields, Erin Nelson, and Claire Novotny. Erin, Claire, Martha King, and the Anthropology Department in general deserve tremendous credit and thanks for creating and welcoming me into such a supportive environment in Alumni Hall where I wrote most of my dissertation (at least the portions of my dissertation not written while riding on trains).

My dissertation journey included a yearlong stretch at the University of New Orleans. I am thankful to have such an incredible extended academic family in New Orleans including Dr. John Renne, Dr. Bethany Stich, Jim Amdal, Dr. Kate Lowe, Carol Short, Dr. Renia Ehrenfeucht, Dr. Marla Nelson, Kyle Griffith, and Babs Mollere.

Lindsay and Jason Mannix of Polygraph Creative designed the logo and branding for

my survey in an exceedingly short amount of time and at a very low cost. I owe you both.

The unconditional love and support of my parents mean so much to me. Thank you, Mom and Dad. Thank you also to my brother Lars for showing me the strength and courage for both of us to walk our own paths.

None of this would have been possible without my best friend (and wife) Laurie. I love you so much. Thank you for encouraging me to start this journey and for helping me finish. We made it! My beloved dog Yelberton Abraham “Scooby Doo” Howlett has taught me so much about love, friendship, and perseverance. Ezra, I am so proud to be your father. You mean the world to me.



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## LIST OF COMMON ABBREVIATIONS

AMPO	Association of Metropolitan Planning Organizations
AASHTO	American Association of State Highway and Transportation Officials
ATA	American Trucking Association
CFR	Code of Federal Regulations
COG	council of governments
DOT	Department of Transportation
FDOT	Florida Department of Transportation
FTA	Federal Transit Administration
FTE	fulltime equivalent
FHWA	Federal Highway Administration
GAO	Government Accountability Office / General Accounting Office
GHG	greenhouse gas
GPATS	Greenville-Pickens Area Transportation Study
GVMC	Grand Valley Metropolitan Council
HTA	Hawaii Transportation Association
HTF	Highway Trust Fund
ISTEA	Intermodal Surface Transportation Efficiency Act
JAPA	Journal of the American Planning Association
JPER	Journal of Planning Education and Research
LRTP	Long Range Transportation Plan
MAP-21	Moving Ahead for Progress in the 21 <sup>st</sup> Century Act
MPO	Metropolitan Planning Organization

NAAQS	National Ambient Air Quality Standards
OMB	United States Office of Management and Budget
RD	Regression Discontinuity
RPA	Regional Plan Association
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SCTA	South Carolina Trucking Association
SOC	Standard Occupational Classification
STIP	State Transportation Improvement Program
TEA-21	Transportation Equity Act for the 21 <sup>st</sup> Century
TMA	Transportation Management Area
TMT	truck miles traveled
US	United States
US EPA	United States Environmental Protection Agency
US DOT	United States Department of Transportation
UZA	urbanized area
VMT	vehicle miles travel

## **1 Introduction: Freight, Planning, and the Metropolis**

Metropolitan New York has a freight transportation problem. And the problem began more than a century ago. By 1914 and the beginning of the first World War, railroads had expanded throughout the United States, creating a vast infrastructure for moving freight. New York City, then and now the largest metropolis in the country, was separated from that network by the Hudson River. A freight train entering or leaving the region had to travel more than one hundred miles north near Albany to traverse the river.

The Hudson River proved challenging for the city of New York, and that challenge was compounded by the fact that a different state, New Jersey, was on the other side of the river. Confronted with this situation, while recognizing the importance of a direct rail connection across the Hudson, businessmen and politicians undertook the difficult proposition of creating a multi-state organization that would be somewhat shielded from political influence with the objective of addressing regional freight transportation problems. In 1921, the Port of New York Authority became the first public authority in the United States (Doig 2001).

Shortly after the Port of New York Authority's creation, a second regional planning organization was forming. Unlike the Port of New York Authority, which had been legally established by the public sector and required an act of Congress, prominent businessmen founded the Regional Plan Association (RPA) as a not-for-profit civic organization that would plan for a twenty-two county region in New York, New Jersey, and Connecticut. The organization had no legal authority to enact the plans they developed, but in a similar manner

to the Commerce Club in Chicago and their renowned 1909 "Burnham Plan" (Smith 2006), the RPA had influential leadership and access to great financial resources. While the regional planning entity had broader concerns than transportation, metropolitan New York's freight and passenger systems comprised a central element of their work. In his book on the history of the RPA and their famous 1929 regional plan, Johnson (1996) contends that the immediate difficulty the Port of New York Authority experienced in carrying out their plans, specifically the lack of progress in building a freight rail connection across the Hudson River, was the primary motivating factor to establish the RPA and develop their comprehensive regional plan. More than three decades later, the RPA released *Freight and the Metropolis*, one of the first monographs on regional freight planning (Chinitz 1960).

Beginning in the 1960s, a new type of organization emerged to conduct regional transportation planning in the United States. Federal policy established and provided funding for these metropolitan planning organizations (MPOs) while also mandating that they perform transportation planning for all projects utilizing federal funds in regions with populations greater than 50,000. The geographic jurisdiction of metropolitan New York's MPO initially mirrored the multi-state arrangement of the RPA. Significant disagreements in the early 1980s, however, led to the dissolution of the organization into multiple MPOs, none of which currently cross state boundaries (Solof 1998).

One century since problem of regional freight transportation led to the creation of the nation's first public authority and one of the first non-governmental regional planning organizations, there is still no freight rail connection across the Hudson River in metropolitan New York. Rail freight must either be offloaded onto trucks, travel more than one hundred miles north to the nearest bridge, or float across the Hudson on one of the two remaining

barges that carry rail cars. The float barges represent a method of goods movement deemed “the epitome of 19<sup>th</sup>-century technology” by a prominent local official (McGeehan 2014). The Port of New York Authority could construct, own, and operate the World Trade Center, the tallest building on the planet when it opened in the 1970s but not a freight rail connection between New Jersey and New York.

Yet, plans for a Hudson River freight rail tunnel endure. In 2014, a first Environmental Impact Statement (EIS) for the Cross-Harbor Tunnel was completed (Jaeger 2015). The port authority, now known as the Port Authority of New York and New Jersey serves as the primary organization leading this project. The MPO for New York City, the New York Metropolitan Council (NYMTC), features the rail tunnel prominently in its most recent long-range transportation plan (New York Metropolitan Transportation Council 2013). In contrast, the cross-Hudson freight rail project is conspicuously absent from the long range plan of the northern New Jersey MPO (North Jersey Transportation Planning Authority 2013). The RPA expresses concerns on prioritizing the Hudson River freight rail tunnel over other large-scale transportation infrastructure projects (Rubinstein 2013; Testimony on Cross Harbor Freight Study 2015).

The problem and paradox of regional freight planning persists. The challenges of freight mobility provided the impetus for many of the first regional plans and organizations in the United States, yet freight planning today is an emerging area for researchers and professionals. This study seeks to advance the understanding of regional freight planning and specifically the role of MPOs within these efforts as policymakers, members of the business community, stakeholder organizations, and the American public continue to grapple with addressing these freight transportation challenges.

## **1.1 Freight Transportation in 21<sup>st</sup> Century America**

The efficient and reliable movement of goods provides the foundation for economic activity in the United States. While freight transportation generally remains in the background of daily existence, the volume and value of goods moved on the freight transportation system are staggering. Every day in 2012, 54 million tons of goods worth \$48 billion were transported on the US freight transportation network (US DOT 2013, 3).

The movement of goods and its supporting systems are also complex. Freight transportation, which may be defined as “the movement of material goods...rather than people” (Woudsma 2001, 2440), incorporates a vast range of transportation activities from trucking gravel within a small town to flying pharmaceuticals across the globe. Trucking, marine and maritime shipping, railroad, airplane, and pipeline constitute the primary freight transportation modes.

The US faces numerous challenges to sustaining an efficient and reliable freight transportation system. The growth in goods movement volumes threatens to exceed system capacity. International trade increased in value by 8 percent per year from 1990 to 2008 (US DOT 2009). While freight volumes grew, US transportation network capacity did not keep pace. Between 1990 and 2007, vehicle miles traveled (VMT) on the nation’s highways increased by 41 percent while highway system mileage only rose by 4 percent (US DOT 2009). Freight trucks are responsible for 9 percent of US highway VMT (US DOT 2013, 29). In the past three decades, commercial truck VMT grew at a faster rate than passenger VMT (National Surface Infrastructure Financing Commission 2009).

Growing freight volumes are not confined to trucking. In ton-miles, railroad freight doubled from 1980 to 2010 while air freight tripled (US DOT 2014, Table 1-50). The Federal

Railroad Administration (FRA) estimates that each year every American requires approximately 40 tons of goods moved on the nation's freight transportation network (FRA 2010), and continuing population growth directly translates into expanding freight volumes. With the US Department of Transportation projecting the value of domestic freight, exports, and imports to more than double between 2007 and 2040, congestion will likely continue to threaten US freight mobility (US DOT 2013).

The movement of goods generates tremendous externalities both positive and negative, although costs tend to be concentrated locally with the benefits more broadly distributed. The wide array of consumer goods available to the American public has largely resulted from a tremendous decline in freight transportation costs. Glaeser and Kohlhase (2004), for example, show that in constant dollars the cost to move one ton of freight one mile by railroad declined 87 percent from 1890 to 2001. Freight transportation creates jobs, directly and indirectly. More than 2.3 million Americans work as commercial truck drivers; truck driving alone accounts for almost 2 percent of all US employment.<sup>1</sup>

Negative externalities produced by the movement of goods include congestion, noise, air quality, and other impacts related to health and safety. Freight transportation not only contributes to congestion but system delays directly affect the costs of logistics. In the widely-cited Texas Transportation Institute (TTI) Mobility Report, for example, the authors note the disproportionate impacts of trucking, concluding, "While trucks only account for about 7 percent of the miles traveled in urban areas, they are almost 23 percent of the urban 'congestion invoice'" (Shrank, Eisele, and Lomax 2012, 9). Many of the negative externalities are geographically proximate to major infrastructure and freight facilities. A

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<sup>1</sup> In May 2009, according to the US Department of Labor, there were 1,550,930 heavy and tractor-trailer truck drivers and 834,780 light and delivery services truck drivers. Total US employment was 130,647,610.

primary reason why there has been only one new airport built in a US metropolitan area in the four decades between 1975 and 2015 is because of intense public opposition to transportation infrastructure that generates intensely localized costs despite substantial metropolitan benefits (Altshuler and Luberoff 2003; Erie 2004; Giuliano 2004).

Freight transportation and the movement of goods also influence land use patterns and the spatial structure of metropolitan areas. In many areas of the United States, the businesses and activities related to freight transportation have been decentralizing, resulting in what has been termed “logistics sprawl” (Dablanc 2014; Dablanc and Ross 2012). Freight transportation and logistics land use patterns, however, are complex and in some metropolitan areas there have been trends toward the concentration of warehousing and logistics activities (Cidell 2010). The high-volume trading relationships between the United States, Mexico, and Canada have increased the importance of cross-border goods movement, north-south transportation routes, and metropolitan areas near border crossings (Bradbury 2002).

The nation’s infrastructure is aging, and maintenance needs vastly exceed available funding. The American Society of Civil Engineers (ASCE) regularly releases an infrastructure report card, and in 2013 the United States received an overall infrastructure grade of D+. The organization estimates that a \$3.6 trillion investment is needed by 2020 to fully address the widespread deficiencies (ASCE 2013). The popular television news show *60 Minutes* showcased the crisis in transportation infrastructure in a 2014 feature titled “Falling Apart: America’s Neglected Infrastructure” (Kroft 2014). While infrastructure issues extend beyond freight transportation, the movement of goods is central to many of the ASCE’s transportation infrastructure categories: Aviation, Bridges, Inland Waterways, Ports,



Rail, and Roads.

## **1.2. Study Objectives**

The combination of the centrality of freight transportation to economic activity, increasing negative externalities, rising freight volumes, limited public funds, and aging infrastructure has generated general agreement about the need to address freight mobility challenges. As Rosenbloom and Wachs (2012, xi) contend, “There is widespread consensus that there are serious problems in the U.S. supply chain network that threaten the nation’s economy and productivity.” However, much less agreement exists on how to address these challenges. As the cross-harbor freight rail problem in New York illustrates, freight planning responses may emerge from organizations in multiple sectors as well as varying geographic scales. Freight planning initiatives are often complex and challenging to implement.

Many governmental, non-profit, and private organizations have recently called for an expanded federal role in freight transportation (e.g. ASCE 2013; Bonney 2010; GAO 2008; Hillestad, Van Roo, and Yoho 2009; National Surface Infrastructure Financing Commission 2009; National Transportation Policy Project 2009; Rosenbloom and Wachs 2012).

Historically, the planning and provision of transportation infrastructure has been closely linked with the federal government, especially for interurban and interstate transportation networks. Transportation planning for metropolitan areas as delineated by the US Government is a standardized process of intergovernmental cooperation between states and regions. State departments of transportation (state DOTs) work with regional metropolitan planning organizations in a process that proceeds from setting “regional vision and goals” to project implementation and performance monitoring (US DOT 2007).

While federal policy and legislation has required transportation planning in

metropolitan areas since 1962, the 1991 federal transportation legislation Intermodal Surface Transportation Efficiency Act (ISTEA) sought to broaden transportation planning efforts into an integrated, multimodal practice as well as increase the authority of MPOs relative to state DOTs (Dilger 1992; Gage and McDowell 1995; Solof 1998; Weiner 2013). Per federal law, states and regions must incorporate goods movement into their planning processes. Although some MPOs carry out robust freight planning practices by integrating goods movement into their travel demand models, creating stand-alone freight plans, and maintaining institutionalized committees of freight stakeholders, many MPOs have no or limited ability to conduct freight planning (AMPO 2003; Bond, Kramer, and Seggerman 2010; GAO 2003; GAO 2009; Schank, Hirschman, and Elliott 2008).

The disjuncture between the primary role of MPOs in federally-mandated regional transportation planning and relatively low levels of MPO capacity to conduct freight planning, generates questions forming the overarching analytical framework for this study:

- Why are some MPOs better able to plan for freight than others?
- What are the effects of federal policy on MPO freight planning capacity?
- How do freight stakeholder organizations from multiple sectors influence MPO freight planning?

This study focuses on understanding how freight transportation planning occurs at the regional level in the United States with an emphasis on the role of metropolitan planning organizations. A focus on MPOs allows for an examination of public sector freight planning efforts as well as an evaluation of federally mandated urban transportation planning carried out by MPOs. This study also contends that public, private, non-profit, and quasi-governmental organizations can and do engage in regional freight planning and that the level and the type of MPO freight planning may be influenced by the efforts of and interactions with other freight stakeholder organizations.

### **1.3 Study Overview**

To examine the role of MPOs in regional freight planning within the contexts of federal policy and the planning of regional freight stakeholder organizations, this study adopts a sequential mixed-methods research design (Creswell and Plano-Clark 2007). The first phase of the study consists of a national survey of MPOs that is then analyzed quantitatively to better understand and answer questions related the effects of federal policy. The findings from the quantitative analysis of the national survey provide the basis for case study research that seeks to better understand MPO freight planning within the regional context of multisector freight stakeholders. Whereas the national survey facilitates the collection of data from a large number of the same type of organization, the case studies provide the opportunity to collect data from organizations representing multiple sectors and interests.

### **1.4 Study Organization**

This monograph consists of seven chapters organized in the following manner. After the introduction, Chapter 2 features an interdisciplinary review of pertinent literature. The literature review's major areas of focus include public sector freight planning, organizational and planning capacity, federal policy, regional champions, and regional regime or coalitions. Based on that literature review as well as the study objectives from Chapter 1, the main research questions are presented toward the end of Chapter 2, which also includes a conceptual framework that models the regional freight planning with an emphasis on the role of MPOs.

Chapter 3 details the research design, data collection, and analytical methods utilized in this study. Chapters 4 and 5 present the findings of quantitatively analyzed data from the

national survey of MPOs. Chapter 4 covers results that emerged from an analysis of summary statistics, and Chapter 5 features the results from inferential statistical models, both regression discontinuity and multiple regression, that seek to explain variations in MPO freight planning capacity. Chapter 6 presents the findings from the study of four cases: Greenville, South Carolina; Grand Rapids, Michigan; Honolulu, Hawaii; and Fort Myers, Florida. The final chapter, Chapter 7, concludes the study with an examination of the main findings, avenues for future research, and implications for public policy.

## **2 Literature Review and Conceptual Framework**

The purpose of this chapter is to provide the theoretical foundation for examining regional freight planning by focusing on MPOs in relationship to both federal policy and the efforts of other freight stakeholder organizations. One of the primary aims of this study is to better explain why some MPOs have a greater ability to plan for freight than others, which can be defined as an MPO's freight planning capacity. The chapter begins with a review of theory on public sector freight planning. Planning capacity is then considered within the broader organizational capacity literature. Findings from empirical studies of planning capacity are also reviewed. The literature review continues with an overview of two potential explanations for variations of MPO freight planning capacity: the effects of federal transportation policy and an MPO's relationships with other regional organizations that also plan and make decisions about freight transportation. Building off the review of literature, the chapter concludes with the formulation of research questions and a conceptual framework to model an MPO's role in regional freight transportation planning.

### **2.1 Public Sector Freight Planning**

In order to gain a greater understanding of how and why regional freight planning occurs as well as to address questions concerning the role of MPOs in regional freight planning, an examination of what it means to conduct freight transportation planning will first be addressed. While some academic disciplines and fields have studied freight transportation extensively such as supply chain management (e.g. Bookbinder 2013; 2012; Coyle et al. 2011), operations research (Dolgui and Proth 2010; Ravindran and Warsing

2013; Sciomachen, Acciaro, and Liu 2009), and geography (e.g. Rodrigue, Comtois, and Slack 2013), within urban planning and urban transportation planning both the empirical and theoretical research on freight transportation is much more limited. In these academic fields, the movement of goods has traditionally been the focus of less research and literature than the movement of people (Woudsma 2001).

The *Atlantic Cities* highlighted the general disregard of freight transportation within urban planning in a May 2013 news article featuring the arresting headline: “The Forgotten Urban Transportation Problem We Should Be Trying to Fix” (Jaffe 2013). The article details how freight transportation has traditionally been absent within planning for cities and regions. In reference to the paucity of attention given to freight, the article quotes Dr. Genevieve Giuliano of The University of Southern California remarking, “It’s fascinating to me that it’s never been a part of city planning” (Jaffe 2013). The *Atlantic Cities* article was prompted by the publication of a research synthesis on urban freight transportation planning by Giuliano et al. (2013), which includes extensive references on urban freight planning work done in Europe where the field is much more developed.

#### *2.1.a. Justifications for and Objectives of Public Sector Freight Planning*

Since most freight transportation is conducted by private, for-profit companies, the role of the public sector can be unclear. It is entirely reasonable to ask the questions: what are the justifications for public sector involvement in freight planning and what are the objectives of these planning efforts?

Kenneth Ogden in his 1992 monograph *Urban Goods Movement: A Guide for Policy and Planning* provides one of the few contemporary in-depth examinations of the justifications for and objectives of public sector freight planning. Ogden divides the central

aims of public sector freight planning into three categories: economic development, transport efficiency, and minimization of adverse impacts (Ogden 1992, 5). When discussing the role of the public sector in urban goods movement policy and planning, Ogden focuses primarily on what he terms its “social costs” (1992, 70). However, his categorization of social costs also includes positive externalities. Ogden’s framework for understanding the main objectives for public sector freight policy and planning may be summarized as improving freight transport efficiency while balancing economic development considerations and minimizing adverse social and environmental impacts. It should be noted that the while the balancing of economic development, freight mobility, and the minimization of adverse impacts is presented within this framework as the overarching objective of public sector freight planning, these elements are often not complementary and that furthering one aim may negatively impact another.

Chatterjee (2004) directly connects to Ogden’s work while also refining the primary aims of public sector freight planning. Chatterjee writes that Ogden’s monograph is, “the only comprehensive source of information on urban goods movement published in recent years” (2004). While Ogden and Chatterjee both see an important role for public sector freight planning in improving freight transportation mobility and spurring economic development, Chatterjee does not include the objective of minimizing adverse social or environmental impacts. Chatterjee’s conceptualization of freight transportation planning also contrasts with Scott’s (1996) work on the “Planner’s Triangle” with the “Three E’s” of environment, equity, and the economy. The literature on freight transportation planning dedicates a greater emphasis to promoting economic interests and improving system efficiency whereas the broader urban planning literature more often explicitly incorporates

the aims of social justice and environmental protection.

A differing view of the objectives of public sector freight transportation planning, particularly in relationship to urban freight, has recently been advanced by Giuliano (2011). Expanding on that 2011 work, Giuliano et al. (2013) write that the primary role of the public sector in freight planning is “ensuring safety, monitoring competition, regulating for environmental protection, imposing taxes and fees, and, in some cases, providing infrastructure and various services.” This understanding of the public sector’s role in freight planning aligns much more closely with the view of government that functions as regulator and becomes involved in private market activities to minimize negative externalities and protect the public interest. Economic development, often synonymous with freight planning, is mostly absent from this conception. Even infrastructure provision is presented with the qualification of being only an occasional public sector function. The role of the public sector in freight planning advanced by Giuliano et al. (2013) is almost the opposite of Chatterjee (2004), underscoring the disagreement and variation in conceptions of the role of the public sector in freight transportation planning and suggests potentially varying roles for freight planners in metropolitan areas. Depending on “who plans?,” to borrow a term from Dahl’s seminal work (1961), the organizational freight planning objectives may differ dramatically or even be in direct conflict.

### *2.1.b United States Federal Policy and Freight Transportation Planning*

The U.S. Constitution establishes both authority and justification for public sector involvement in freight planning. In addition to the providing Congress the ability to regulate interstate commerce, a section commonly known as the “Commerce Clause,” the Constitution specifically afforded Congress the power to create infrastructure facilitating the



movement of goods. Article I, Section 8 designated the ability for Congress to “To establish Post Offices and post Roads.” That clause is the primary mention of transportation in the U.S. Constitution.

Contemporary federal transportation policy emerged in the decades following World War II and the passage of the Interstate Highway Act in 1956. The massive public works project dramatically reshaped transportation as well as urban and metropolitan form. In a survey of urban planning academics, Fishman (2000) found an overall consensus among respondents that the American metropolis in the second half of the twentieth century was more greatly affected by the interstate highway system and the automobile than any other event, technology, or historical development. The impacts of interstate highways on the United States are not confined to passenger travel and related historical trends such as suburbanization and metropolitan decentralization. The national network of publicly-financed highways coupled with relatively inexpensive fuel helped establish trucking as a primary form of freight transportation, even when moving goods over long distances. One study found that the benefits of the interstate highway system in relationship to improved efficiencies for trucking from 1950 to 1973 are equal to between one-third and one-half of the system’s massive costs (Keeler and Ying 1988).

The scope and spending of the U.S. Government increased dramatically during the 1950s and 1960s with tremendous effects on the nation and its cities. The expansion of federal programs was countered with an increasing call for local control over decision-making (Weiner 2013). Federal transportation policy moved to decentralize authority to state and local levels. Beginning in 1962, U.S. policy required what was termed “urban transportation planning” in regions with populations greater than 50,000 for any project using

federal funds. As the U.S. Government generally provided 90 percent of the funds for projects such as highway expansion, the federal mandate for planning applied to many transportation infrastructure projects. MPOs, the entities required to conduct urban transportation planning in these regions, were provided a dedicated source of federal funding for planning and administrative activities in 1973 (Solof 1998; Weiner 2013).

### *2.1.c MPO Freight Planning since ISTEA*

While the work of MPOs largely centered on the movement of passengers and the allocation of resources between highways and transit, since the passage of ISTEA in 1991, freight has increasingly become a larger part of MPO planning efforts. The policy changes initiated by ISTEA and subsequent federal legislation will be reviewed in greater detail in section 2.3.

The most recent federal legislation contains eight planning factors to shape the MPO planning process. Many of these planning factors directly address goods movement; the first states that metropolitan transportation planning, “Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency” (23 C.F.R § 450.306, 2014). Two of the other factors specifically mention freight in reference to increasing freight mobility and improving connections between freight transportation modes (see Appendix A for complete list of the eight metropolitan planning factors).

Despite the legislative mandate, studies indicate that many MPOs have minimal organizational capacity for freight planning. Bond, Kramer, and Seggerman (2010) showed that only 9 percent of MPOs responding to their survey had freight advisory committees and only 11 percent of the MPOs had a staff member specializing in freight planning. The

Association of Metropolitan Planning Organizations (AMPO 2003) found that that more than 80 percent of responding MPOs dedicated less than 5 percent of staff time to freight issues. The AMPO survey also showed that only 22 percent of MPOs had one more staff members dedicated to freight planning. In a survey conducted by GAO (2009), only 8 out of 326 responding MPOs (2%) reported incorporating rail freight data into their regional travel demand models, although 73 (22%) did include freight truck trips.

Studies also demonstrate that MPOs want and need the ability to better plan for goods movement. Eighty percent of responding MPOs in the 2003 AMPO study identified freight data as an area where they needed greater organizational resources. A joint study conducted by the Federal Highway Administration (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO) came to the unanimous conclusion that freight planning organizations at all state and regional levels necessitated greater training, technical assistance, education and outreach (Quinn and Symoun 2007). GAO (2009) concluded that the main challenges that MPOs face when it comes to all forms of transportation planning center on funding, staffing, authority, and technical capacity.

Efforts to build freight planning capacity have also been a focus of research. AASHTO and FHWA have underscored the connection between freight champions and organizations to form partnerships and augment freight planning abilities (Quinn and Symoun 2007). Goldman and Deakin (2000) emphasized the importance of MPO partnerships with other organizations to help fulfill federal mandates. Before it was closed by President Bill Clinton in 1996, the Advisory Commission on Intergovernmental Relations (ACIR) researched and promoted organizational capacity building in MPOs. One of the final products produced by ACIR was an extensive 1995 study entitled *MPO Capacity: Improving*

*the Capacity of Metropolitan Planning Organizations to Help Implement National Transportation Policies*. Efforts such as the ACIR (1995) report led the creation of the Transportation Planning Capacity Building program in 1998 (Weiner 2013).

## **2.2 Planning Capacity and the Study of Organizational Capacity**

While the US Government has created both the Transportation Planning Capacity Building and Freight Planning Capacity Building Programs, the concept of planning capacity related to transportation has been mostly unexamined in the literature. The Government Accountability Office (GAO) also raises questions about the efficacy of federal efforts to build planning capacity in MPOs, stating that “Little is known...about what has been achieved by the federal government’s investment in metropolitan transportation planning” (2009, 2). Despite the current uncertainties surrounding conceptions of transportation planning capacity and the effectiveness of federal policy, systematic research on organizational capacity dates back to at least the 1970s and the US Government’s efforts on capacity building within intergovernmental organizations.

### *2.2.a What is Capacity?*

Capacity, organizational capacity, and capacity building are concepts referenced frequently in the literature of diverse fields, yet there is minimal consensus regarding their definitions and characteristics. The literature on organizational capacity in the United States largely emerged in the 1970s in response to the federal policy emphasis for advancing intergovernmental relations and regionalism. The federal focus on organizational capacity building helped spur research and analysis on the subject. In 1975, when the U.S. Office of Management and Budget (OMB) promulgated its recommendations on capacity building, *Public Administration Review* dedicated a special issue to OMB’s work including history,

reflection, and analysis. (e.g. Macaluso 1975; Scott and Macdonald 1975; Study Committee on Policy Management Assistance 1975). It is therefore unsurprising that most of this literature focused on the management capacity of governments or governmental organizations. The official recommendations on federal efforts to bolster state and local governmental capacity promulgated by the OMB<sup>4</sup> in 1975 defined capacity as comprising three components: policy management, resource management, and program management (Study Committee on Policy Management Assistance 1975).

Writing in response to the work on capacity building from the 1970s, Gargan (1981) critiqued this focus on governmental capability and stressed the importance of including the resources of the local community. Honadle (1981) sought to further define organizational capacity by excluding capacity from organizational survival and instead focusing on the organization's work. She also discussed how capacity can refer both to an organization's processes as well as its outcomes and that the means and the ends are not necessarily connected.

In reference to governmental organizational capacity, (Gargan 1981, 652) specified it is an organization's "ability to do what it wants to do." Ingraham and Donahue (2000, 294) refined that definition by stating "By capacity we mean government's intrinsic ability to marshal, develop, direct, and control its human, physical, and information capital to support the discharge of its policy directions." Building off this conceptualization, planning capacity may be defined as the ability to plan, the ability for an organization to carry out its policy objectives. The planning capacity concept can be applied to Hopkins (2001) metaphor of planning as river canoeing. In this scenario planning professionals anticipate future events by navigating currents and other obstacles to guide their canoe in the desired direction.

However, what if the planner has never taken any paddling lessons? What if the paddle she or he holds is lacking a blade?

Like canoeists, a planner's ability to act is shaped not only by external conditions but also by personal experience, ability, and resources. Just because a planning organization exists does not mean that it is capable of planning, just as being in a canoe does not make one a river canoeist.

### *2.2.b Planning Capacity Definitions*

The area within urban planning where planning capacity has received greater attention is environmental and land use planning with a particular emphasis on hazards mitigation. An examination of this literature reveals a wide variety of definitions of planning capacity. One standard measure of planning capacity is the number of planners that work on a given plan. May and Burby (1996) utilized this measure in their research on hazard mitigation plan quality in Florida and New South Wales, Australia. Brody, Highfield, and Carrasco (2004) created an index to measure planning capacity comprised of three items: adequacy of budget, technical expertise, and authority to enforce rules and regulations. In research on coastal zone land use plan quality in California, Tang (2008) adopted a broader definition of planning capacity. Instead of combining measures of planning capacity into an index, he utilized five separate measures including the number of planners, how recently the plan was updated, and technical abilities such as the use of GIS.

Perhaps the most extensive analysis of planning capacity within the environmental and land use planning literature is found in the Brody, Kang, and Bernhardt (2010) study of the implementation of flood mitigation techniques in Florida and Texas. Building off the work on organization capacity in multiple academic disciplines, the authors identified 13

indicators of planning capacity measured on an ordinal scale from 0 to 5. These 13 indicators were then combined into an overall index of organizational planning capacity.

While most commonly researched within environmental and land use planning, planning capacity a central concept for other areas within planning. The work of Glickman and Servon (2003) represents one of the most direct considerations of planning capacity that has appeared within the pages of either the *Journal of the American Planning Association (JAPA)* or the *Journal of Planning Education and Research (JPER)*, the two most prominent urban planning journals.<sup>2</sup> Glickman and Servon (1998; 2003) researched planning capacity within the context of community development corporations (CDCs), which are often quasi-governmental entities. The authors divided the concept of planning capacity into five sub-categories: resource capacity, organizational capacity, networking capacity, political capacity, and programmatic capacity. Resource capacity refers to a CDC's financial means, organizational primarily to staffing, networking to relationships with other organizations, programmatic to delivering services, and political to advocating for constituents within the larger political arena. The approach to planning capacity by presented by Glickman and Servon (1998; 2003) differs from approaches in the land use and environmental planning literature that focus primarily on staffing measures and in contrast conceptualizes planning capacity in terms of multiple organizational attributes, potentially offering a more holistic understanding of an organization's capacity to plan.

### *2.2.c Planning Capacity and Planning Outcomes*

In empirical studies within the planning literature, planning capacity has often been found to be associated with plan quality and plan implementation. Burby and Dalton (1994)

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<sup>2</sup> In their survey of urban planning academics, Goldstein and Maier (2010) found that *JAPA* and *JPER* were the field's most central journals.

found a significant effect of staff capacity and commitment on the adoption of development restrictions in hazardous areas by local governments. Brody, Highfield, and Carrasco (2004) showed that planning capacity was highly correlated with plan quality. Burby and May (1998) found that planning capacity was statistically significant and positively associated with increased plan quality in Florida but not in New South Wales, although a small sample size ( $n=20$ ) could have influenced the absence of a statistically significant finding in the second location. Tang (2008) found statistically significant associations between capacity and two of the five measures of coastal zone land use plan quality: the number of planners involved and whether a jurisdiction within a coastal zone had also adopted a coastal land use plan or effort.

The research of Brody, Kang, and Bernhardt (2010) differed from previous studies in that the outcome variable shifted from plan quality to plan implementation. Their research demonstrated a strong relationship between the level of organizational planning capacity and the implementation of flood mitigation strategies in Florida and Texas. In research on hazard mitigation related to transmission pipelines, Osland (2013) found that planning capacity in the form of availability and access to information was positively associated with the adoption of hazard mitigation tools.

The study of planning capacity within the transportation planning literature is limited but has increased in recent years. Deyle and Wiedenman (2014) studied the capacity building of MPO Technical Advisory Committee (TAC) members during the long range transportation planning process. The authors found a statistically significant positive relationship between capacity building as measured by a TAC member's increase in



knowledge, authority, and relationships with other participants and resulting long range transportation plan quality in terms of the efficient movement of people and goods.

#### *2.2.d Determinants of Planning Capacity*

While the work of Glickman and Servon (1998, 2003) suggests that financial commitment, political leadership, organizational structure and program implementation all affect an organization's planning capacity, there are few studies within the planning literature that empirically examine the determinants of planning capacity. Since the conclusions of many studies that connect planning capacity to planning outcomes suggest implementing policies of organizational capacity building (e.g. Brody, Kang, and Bernhardt 2010; Burby and May 1998), understanding the factors that account for higher levels of planning capacity are an important, yet understudied, area of research.

Empirical studies of the predictors and determinants planning capacity have mostly focused on policy mandates, especially as they pertain to intergovernmental coordination. As May and Burby (1996) note, federalism often requires the implementation of policies and regulations at lower levels of government relative to where they were devised and legislated. These lower level organizations are generally seen as lacking the ability to carry out these intergovernmental policies. In their study of hazard mitigation planning, May and Burby (1996) found a positive relationship between state mandates and local planning capacity.

### **2.3 Federal Transportation Policy**

The 1991 federal transportation legislation ISTEA sought to broaden transportation planning efforts into an integrated, multimodal practice as well as increase the authority of MPOs relative to state DOTs. For the first time, ISTEA mandated a defined intergovernmental transportation planning process between MPOs and state DOTs. The

ISTEA legislation was seen as a triumph for MPOs, especially “large MPOs” with populations greater than 200,000 (Dilger 1992; Gage and McDowell 1995; Goetz, Dempsey, and Larson 2002; McDowell 2003). Federal policy, it was seen, devolved and decentralized an unprecedented level of transportation planning authority and decision-making to local and regional levels.

Since the passage of ISTEA in 1991 numerous authors have evaluated ISTEA-era legislation<sup>3</sup>. One primary focus of analysis has been the effects of decentralization of transportation decision-making and policymaking on MPOs. In an early assessment, Dilger (1992, 67) called ISTEA a “landmark piece of legislation” that “significantly strengthens the role of [MPOs] in project selection” and “greatly revises the relationships between MPOs and state departments of transportation.” Multiple later studies supported the initial judgment. Wachs (2004, 148) maintained that MPOs “gained considerable influence with the passage of [ISTEA].” Goetz, Dempsey, and Larson (2002, 87) argued that the 1990s was a period of “empowerment” for MPOs and that their role in transportation planning increased markedly. Rusk (2003, 119) emphasized the federal legislation’s potential for expanding regional planning and increasing citizen participation, articulating, “for most metropolitan areas, multigovernmental, designated Metropolitan Planning Organizations are the only bodies where grassroots movements can lobby for regional reforms.”

Some authors such as Wolf and Farquhar (2005) noted the expanded powers of MPOs while arguing that the organizations still possessed limited abilities to influence regional transportation initiatives. In Edner and McDowell’s (2002) assessment, the authors offered a

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<sup>3</sup> The subsequent federal surface transportation legislation after ISTEA, TEA-21 in 1998, SAFETEA-LU in 2005, and MAP-21 in 2012 represent continuation and refinement of ISTEA rather than major changes. It is reasonable to consider 1991 to 2014 to represent a stable period of federal surface transportation policy.

tempered view on the transformational qualities of ISTEA-era legislation for MPOs. They concluded that “ISTEA did little to change the decision making role of MPOs” and that “ISTEA did little to enhance the authority and autonomy of MPOs as independent institutional entities” (2002: 18). The authors contended that although ISTEA expanded the powers of MPOs (and especially the larger MPOs) in terms of project selection, that MPOs were still beholden to the interests of their state DOT. State DOTs retained control of federal dollars and remained responsible for project implementation. Edner and McDowell (2002) also noted that MPOs remained unable to raise their own funds and generate revenue, an issue later explored in greater detail by Sciara and Wachs (2007). Funding levels often impact organizational capacity in terms of staffing levels, organizational resources, and organizational specialization as well as in terms of relative influence with organizations from multiple sectors.

A paradox exists at the center of metropolitan transportation planning. Numerous authors advocate for a more regional approach to planning issues (e.g. Calthorpe and Fulton 2001; Downs 1994; Katz, Puentes, and Bernstein 2005; Rusk 2003). Although some regional planning organizations receive a wide amount of attention in areas such as Seattle and Minneapolis, these efforts are seen as exceptions rather than commonplace (Wallis 1994a). It is in transportation with its almost 400 MPOs where regional planning is thought to exist, but Giuliano (2004) maintains that these entities have often been ineffective in achieving regional goals. Katz, Puentes, and Bernstein (2005) identified multiple explanations that impeded MPO success, including “insufficient metropolitan devolution” and “inadequate capacity [of MPOs].” The foundation of these authors’ argument that “the responsibility and capacity of metropolitan planning organizations must be expanded” (2005, 31) is the

assumption that greater decentralization of federal transportation policy decision-making will result in more effective transportation planning.

### *2.3.a Transportation Management Areas*

ISTEA in 1991 created two categories of MPOs: transportation management areas (TMAs) representing urbanized areas with populations greater than 200,000 and MPOs with populations between 50,000 and 200,000. McDowell (2003) specifically distinguished between TMAs and smaller MPOs when assessing the effects of ISTEA-era transportation policy, contending that larger MPOs (TMAs) and state DOTs must rely on each other for success while smaller MPOs have a more imbalanced relationship with their state DOT. When Goetz, Dempsey, and Larson (2002) asserted that ISTEA-era legislation led to MPO “empowerment” they specifically used this term in relation to TMAs and their elevated role in project selection.

For project selection, TMAs are given authority over a portion of surface transportation program (STP) funds. Puentes and Bailey (2005) estimated that MPOs are suballocated approximately 6 percent of all federal transportation dollars. The amount of federal funds suballocated to MPOs, however, varies widely. States are also allowed to suballocate other transportation funds to MPOs, including congestion mitigation and air quality (CMAQ) and transportation enhancement (TE) funds. California has increased its suballocation of STP, CMAQ and other federal funds, although sometimes decision-making is even further devolved to the county level (Giuliano 2004; Lewis and Sprague 1997; Sciara and Wachs 2007). Differences in suballocation may indicate varying commitment by states and state DOTs to the decentralization of transportation decision making.

TMAs are also viewed by some researchers and policy analysts as having a more-

balanced relationship with their state DOT, and this responsibility comes with additional requirements. TMAs can veto projects selected by the state (Katz, Puentes, and Bernstein 2005, 21). The organizations must implement a congestion management system and must also be federally certified every three years (Weiner 2013, 178). Even though the additional authority and responsibility granted to TMAs may seem small, authors cite this level of decentralization as highly significant. McDowell (2003, 75), for example, concluded that the authority granted to TMAs “sets a precedent that the smaller MPOs and other federal-aid recipients envy.”

There is limited empirical research into the differences work and planning effectiveness between TMAs and non-TMA MPOs. However, Puentes and Bailey (2005) have studied differences between the usage of STP funds in metropolitan areas by TMAs and state DOTs. The authors found that between 1998 and 2002 state DOTs utilized only 2.5 percent of the STP funds they controlled in urbanized areas for transit projects, while TMAs dedicated 9.3 percent of STP funds to transit. The authors concluded that the disparity in STP usage in the same geographic areas suggested different transportation priorities for the state DOTs and TMAs.

### *2.3.b Other Federal Policies*

Since the passage of several landmark environmental laws in the early 1970s, air quality has commonly been associated with transportation planning at local and regional levels. Cities and regions that are non-compliant for National Ambient Air Quality Standards (NAAQS) may find their ability to receive federal aid for transportation projects restricted. Two of the central requirements of MPOs, the adoption of a long range transportation plan (LRTP) and a list of projects to be undertaken in the near future (transportation improvement

program or TIP) must conform to air quality standards (see Wachs and Dill 1999; Weiner 2013).

### *2.3.c Intergovernmental Transportation Planning*

Despite some changes in terms of devolution initiated by ISTEA-era federal legislation, state departments of transportation still maintain prominent (some critics say dominant) roles in transportation planning. Even though TMA designation means that some federal transportation funding is suballocated to larger MPOs, a process that in practice gives MPOs greater project selection authority with these funds, all federal monies remain with and are administered by the state DOT (Edner and McDowell 2002; Sciara and Wachs 2007). State DOTs are also responsible for project implementation (Edner and McDowell 2002). MPOs, except in rare circumstances, remain unable to raise their own revenue (Sciara and Wachs 2007). In the planning literature, numerous articles highlight the importance of state-level commitment in achieving desired local planning outcomes (e.g. Burby and May 1998; May and Burby 1996; Norton 2005; Rodriguez, Targa, and Aytur 2006). Wolf and Farquhar (2005, 1,064) underscore the importance of state-level efforts in transportation, asserting, “How SDOTs relate to the MPO process largely determines MPOs success.” In their study of large MPOs, Taylor and Schweitzer (2005) found that the vast majority of MPOs surveyed relied on their state DOT for technical assistance with freight including data and forecasts.

One potential consideration when assessing regional transportation planning is that the role and importance of MPOs have been overstated. The possibility exists that the amount of funding, research, analysis, and interest in MPOs is much greater than the actual effect MPOs have on transportation planning, transportation decision-making, and the spending of public sector transportation funds. Lowe (2014), in an examination of MPO transportation

planning in Boston, writes, “The MPO-led rational planning process also creates the impression that MPO planning is the regional decision site. Such tension between the planning process design and actual sites of decisions might occur in other multijurisdictional planning efforts.” In this conceptualization, an MPO might seem like the place of regional transportation planning, but the actual planning and decisions are actually occurring somewhere else. If MPOs are not doing the regional planning, who is?

## **2.4 Governance and Multisector Planning**

Literature about the practice of planning often implicitly assumes that the planning discussed is being carried out by the public sector. Planning in this framework is viewed as public intervention into private sector activities (Alexander 1994). Hopkins (2001, xiii), for example, begins his book with the statement: “Urban planning is used loosely to refer to intentional interventions in the urban development process, usually by local government.” Hopkins later counters that assertion by detailing how multiple actors make plans affecting both public and private decisions, blurring the distinction between intervention and interaction.

In the past two decades, the urban politics literature has made theoretical distinctions between government and governance (see Feiock 2004; Stoker 1998). Whereas government refers to the traditional public sector role, governance represents a multisectoral understanding of decision-making and governing. According to Savitch and Vogel (2000, 161), the traditional definition of government “entailed formal institutions and elections and established decision-making processes and administrative structures.” The paradigm shift from government to governance results in systems where “the boundaries between and within public and private sectors have become blurred” (Stoker 1998, 17). Governance therefore

includes not only formal governments but also “voluntary, not-for-profit, and private organizations, as well as intergovernmental linkages” (Feiock 2004, 3). While the urban politics literature has transitioned from government to governance, much of the planning literature still associates the implicit adjective phrase “public-sector” with the term planning. Some planning scholars have come to reject the division between public and private sectors as a false dichotomy and instead examine planning within a multisectoral context (e.g. Alexander 1992, 1994; Fainstein and Fainstein 1981).

#### *2.4.a Political Economy*

For several decades, scholars in urban politics have concentrated on answering the question “who governs?” (e.g. Dahl 1961; Hunter 1953; Peterson 1981). This research created large debates, essentially pitting two theoretical sides against each other: the business elites where private interests dominated government decision making and the pluralists who argued that the government still maintained the central role in governing (for a review, see Hamilton 2002; Vogel 1992). Vogel (1992) argues that the political economy approach could help resolve these debates and allow for a basis to study the question of “who governs” urban areas. Political economy examines the relationship between the public and private sectors without adopting an economic determinism. Fainstein (2000) contends that the main questions asked by political economists are “who dominates?” and “who benefits?”

Political economy may be particularly suited for the study of freight planning because almost all freight transportation is conducted by private companies (the US Postal Service and the military are prominent exceptions) and yet is affected by public-sector organizations through laws, regulation, public funding, and the provision of infrastructure. With an organization such as the American Trucking Association actively advocating for an increase



in the federal fuel tax and the creation of a federal office for freight planning (Bonney 2010; Mongelluzzo 2010), it is difficult to construe freight planning as a deliberate governmental intervention in which there exists a clear distinction between public and private sectors. Instead of a binary division between public and private, for freight planning the perspective of a system of freight stakeholders likely more adequately describes planning processes.

Goldman and Deakin (2000) examined how by partnering with other organizations MPOs may become more effective planning organizations. The authors write that “it can be argued that the aggressive pursuit of partnerships represents MPOs' best hope for being able to fulfill their roles under ISTEA” (2000, 52). Business organizations including chambers of commerce may become partners on freight transportation issues. While Wolf and Farquhar (2005, 1067) contend that, “The freight industry, in particular, has been slow to request a seat at the MPO planning table,” Wilbur Smith Associates (2010, 3-1) asserts that “economic development agencies and chambers of commerce can be key allies in freight planning initiatives.”

#### *2.4.b Urban Regime Theory*

Within the broader framework of political economy, urban regime theory was developed to explain governing coalitions within cities and metropolitan areas. Stone's (1989, 1993) work provides much of the foundation for urban regime theory, and he defines a regime as “the informal arrangements by which public bodies and private interests function together in order to be able to make and carry out governing decisions” (1989, 6). A regime is a type of coalition that possesses certain characteristics. According to Mossberger and Stoker (2001), a regime is a coalition that includes both public and non-governmental (especially business) entities, concentrates on accomplishing specific tasks or policy

objectives, has a discernible policy focus, and exists on a longstanding rather than temporary basis.<sup>4</sup>

While Stone's work specifically focused on the city as the unit of analysis, Hamilton (2002, 2004) expanded urban regime theory to regional regimes. Mossberger and Stoker (2001, 827) in their review of the evolution of regime theory asserted, "the use of the regime concept at the regional level is promising." In Stone's (1989, 4) seminal work, he wrote that the informal arrangements that undergird regimes "are by no means peculiar to cities, or, for that matter, to government." The application of regime theory to a study of regional coalitions based on a planning and policy subject is consistent with this literature.

Leo (1998) applied regime theory to the study of regional planning and the how a multisector coalition came together to achieve what is often-considered a desirable planning outcome: growth management. In contrast to Stone's (1989) analysis of regimes in Atlanta where the governing coalition often undermined public sector planning efforts, Leo (1998) found that in Portland, Oregon a coalition comprised of both business groups and environmental organizations worked together to help implement and maintain growth management policies and programs. Both the Atlanta and Portland cases show, in contrasting ways, how governing coalitions directly affect planning processes and outcomes.

One critique of urban regime theory is that it should be considered as a concept instead of a theory because of its limited explanatory power (Mossberger and Stoker 2001). Hamilton (2004), however, offered a proposition related to the civic sector's role in the formation of regional regimes. The civic sector refers to non-profit organizations that are

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<sup>4</sup> These four characteristics define regimes as a specific type of coalition and distinguish regimes from other sets of relationships such as policy networks (Mossberger and Stoker 2001). Applying regime theory to the study of MPOs requires an inclusion of nongovernmental actors, which would be different from other MPO studies focusing solely on intergovernmental relationships (e.g. Taylor and Schweitzer 2005).

largely funded and guided by business interests (Hamilton 2004, 458-459). Hamilton asserted that many public sector organizations lack the ability to form regional coalitions and instead it is the civic sector that often takes the lead role. He wrote, “Without an active civic sector and a dedicated [civic] agency involved in regional governance issues, the capacity for private sector involvement in regional governance is greatly diminished regardless of what other favorable elements are present” (Hamilton 2004, 459-460). This assertion provides a theoretical foundation to help explain the formation of regional regimes.

#### *2.4.c Regional Policy and Issue Champions*

An individual or organization may influence metropolitan governance as a participant within a coalition or act more independently as a policy or issue champion. A body of literature focuses on the roles of champions or advocates in relationship to bicycle and pedestrian planning. As planning organizations tend to begin specializing in bicycle and pedestrian planning after the more traditional areas of highway and transit planning (Bond, Kramer, and Seggerman 2010), experiences with bicycle and pedestrian planning may be particularly relevant to metropolitan freight planning.

Multiple studies demonstrate the importance of champions for developing multiuse trails. Walker et al. (2011) concluded that the creation of a multiuse recreational and utilitarian trail in Georgetown, South Carolina would have likely failed without a trail champion’s efforts. Wiggs, Brownson, and Baker (2008) found that with strong leadership even a small town in rural Missouri could effectively develop a walking trail. An analysis of trail development in six states performed by Eyler et al. (2008) underscored the importance of community trail champions in conjunction with building partnerships across sectors. The individuals and organizations that came together in partnerships included “private funders;

city, state, and federal organizations; advocacy organizations; community residents; engineers; planners; local businesses; utility companies; and others” (425-426).

The importance of regional champions to MPO planning has been studied by Handy and McCann (2011) in reference to bicycle and pedestrian planning. Using Edner and McDowell (2002) as a theoretical framework, the authors contend that advocates may become involved in MPO planning because of the potential for the MPO to direct resources to an issue or mode. The six metropolitan case studies performed by Handy and McCann (2011) supported this assertion as they found that the presence and participation of advocacy groups was critical in an MPO allocating greater resources to bicycle and pedestrian planning. The authors also demonstrated a relationship between regional advocacy groups and the support of local governments, concluding “None of the regions has supportive local governments without also having strong local or regional advocacy groups” (2011, 35).

In addition to research showing the connection between champions and planning outcomes, there is emerging work on the relationship between a policy champion and planning capacity. Smith, Lyles, and Berke (2013) highlighted the importance of a champion within an organization for the successful building of hazard mitigation planning capacity. Salvesen et al. (2008) found that a combination of strong champion along with organizational capacity, commitment, intergovernmental coordination was important for implementing policies to promote physical activity in Montgomery County, Maryland.

## **2.5 Research Questions**

The literature review underscores that both in research and in professional practice there is substantial uncertainty about regional freight planning in the United States. While regional freight planning has received greater emphasis within federal transportation policy

since the passage of ISTEA in 1991, the literature is inconclusive about whether these policies have bolstered MPO freight planning capacity. The objectives of freight planning, even when confined to public sector efforts, are varied and may often conflict. Freight transportation is a relatively new area of work for many MPOs, and the role of MPOs in regional freight planning remains unclear. Freight planning is not limited to the efforts of public sector organizations such as MPOs, and it is possible that a region could have an active coalition of freight stakeholders while concurrently having an MPO with limited ability to plan for freight.

Emerging from the review of literature, I developed a set of research questions to structure my study. The research questions are

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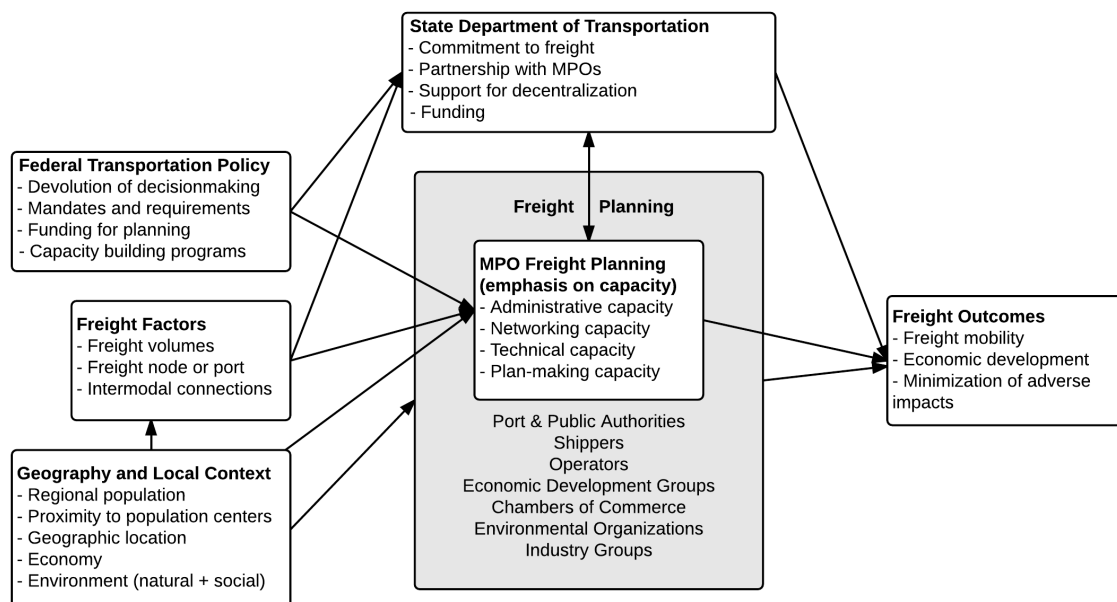
**Why are some MPOs better able to plan for freight transportation than others?**

1. What are the effects of federal policy on MPO freight planning capacity?
    - 1a. Has the federal policy of designating larger MPOs as transportation management areas (TMAs) increased MPO freight planning capacity?
    - 1b. Do other federal policies and initiatives (e.g. air quality standards) influence an MPO's freight planning capacity?
    - 1c. Although federal policy mandates MPO freight planning, why are many MPOs doing little freight planning?
    - 1d. What are other potential determinants of MPO freight planning capacity?
  2. How do freight stakeholder organizations from multiple sectors influence MPO freight planning?
    - 2a. Are higher levels of MPO freight planning capacity linked to regional coalitions of freight stakeholders or the presence of a regional freight champion?
    - 2b. If many MPOs do minimal freight planning then who plans?
    - 2c. Why do some regions and not others have coalitions of freight stakeholders or a freight champion?
    - 2d. Do the objectives and motivations for MPO freight planning differ from those of other organizations? If yes, how do those differences influence regional freight transportation planning activities?
    - 2e. How does freight planning differ in regions with and without active public sector participation in the form of MPO planning?
-

## 2.6 Conceptual Framework

To examine the preceding research questions, I created a conceptual framework based on the preceding literature synthesis to model the regional freight transportation planning process (see Figure 2.1). The framework takes the traditional urban transportation planning process as stipulated by federal law and places it within a regional context of stakeholder organizations from multiple sectors that plan and make decisions about freight transportation. The conceptual framework provides the foundation for the research design and methods to examine the primary research questions for this study. The conceptual framework assumes feedback loops between the different dimensions of regional freight planning. For example, regional freight planning will produce freight outcomes that feed back into freight factors. The feedback loops are not depicted in Figure 2.1 to improve the diagram's clarity.

Figure 2.1 Conceptual Framework of Regional Freight Transportation Planning



\*Note: feedback loops are not depicted in above figure

### *2.6.a Hypothesized Explanations for MPO Freight Planning Capacity*

The conceptual framework combines two explanations for variations in MPO freight planning capacity that emerged from the literature review into a unified model. These two explanations can be summarized as the influence of federal transportation policy and the work of MPOs within a broader context of multisector regional freight planning.

#### *2.6.a.1 Influence of Federal Transportation Policy*

An examination of the effects of federal transportation policy on freight planning at local and regional levels is one of the primary aims of this study. The federally-mandated process for urban transportation planning is generally described in straightforward terms. The federal government sets the overall policy and then the actual planning is done at state, regional, and local levels. Considering that MPOs on a nationwide scale would not exist without federal legislation and policy, I hypothesize that federal policy significantly and positively influences an MPO's ability to conduct freight planning.

My research on the effects of federal policy focuses on one of the central changes introduced in the landmark 1991 legislation ISTEA: the separation of MPOs into two categories based on regional population. Numerous studies reviewed in this chapter contend that the greater authority and autonomy granted to MPOs with regional populations higher than 200,000 has been one of the most important developments in contemporary federal transportation policy. These larger MPOs receive TMA designation. I hypothesize that MPOs with TMA designations with their greater levels of authority and autonomy have higher levels of freight planning capacity than MPOs without this designation when controlling for other factors.

### *2.6.a.2 Multisectoral Regional Freight Planning*

I also expect that an MPO's participation in a regional freight regime is positively associated with higher levels of MPO freight planning capacity. I contend that organizations outside of the MPO will take the impetus for forming a regional freight regime and that participation in such a coalition will lead to higher levels of MPO freight planning capacity. It could reasonably be argued that the direction of the relationship occurs in the opposite manner. In this scenario an MPO dedicated to freight issues provides the organizing role for a regional freight effort. Yet, multiple studies and reports show that MPOs have more statutory responsibilities than resources and struggle to carry out all that is required of them (e.g. GAO 2009; McDowell 1999). Given freight's relatively low profile compared to auto, transit, bicycle, and air quality it is unlikely that an MPO would dedicate significant resources to goods movement without being actively encouraged by outside entities. Freight planning at MPOs may be similar what Handy and McCann (2011) found in regards to bicycle and pedestrian planning where local government support always occurred in conjunction with strong advocacy groups.

### *2.6.a.3 Urban Transportation Planning Process*

Although federally-mandated urban transportation planning is often portrayed as a standardized intergovernmental process, the devolution of policy implementation to 51 state DOTs and 381 MPOs ensures the planning process can vary depending on the relationships among states, regions, and localities. State DOTs have traditionally had much greater power and influence than MPOs. Even though contemporary federal transportation legislation has elevated the stature of MPOs, there is still discrepancy in the size of these organizations. Most MPOs have fewer than ten employees whereas the payroll for state DOTs may extend



into the tens of thousands. Relationships between state DOTs and MPOs can vary by state with some state DOTs supporting the authority of MPOs much more than others. Although this study focuses on regional freight planning, the role and influence of state department of transportation remains an overarching consideration.

#### *2.6.a.4 State, Regional, and Local Contexts*

In addition to federal transportation policy, regional freight stakeholder organizations, and intergovernmental relationships, there are other factors that should affect MPO freight planning capacity. The volume of freight in a metropolitan region is likely correlated with an MPO's interest and commitment to freight planning. More freight probably equates to more planning. Freight volumes and regional population are also likely correlated. More people probably equates to more freight.

There are historical and geographic factors that may affect regional freight planning as most of the cities that expanded in the hundreds of years prior to World War II were usually founded because of their freight transportation geography and infrastructure advantages. Chicago is the third largest city in the United States largely because of its historical role as the transfer point for railroad freight moving from the agricultural Midwest to the populous east (Cronon 1991). The geographic location of a city and region could influence the level of freight activity and freight planning. Many warehouses have located in the industrial Midwest because of the geographic proximity to population centers (Bowen 2008; Cidell 2010; Hesse and Rodrigue 2004).

Directly related to freight volumes, history, and geography is whether a metropolitan area serves as a major international freight gateway for the United States. A region's status as a major seaport, land border crossing or air freight hub would likely influence the level of

freight planning activity done by MPOs and other organizations. Areas that serve as significant transfer points for domestic freight could share similar characteristics. The federal government has supported the provision and maintenance of infrastructure that facilitates the transfer of freight between modes by identifying sections of roads that serve as intermodal connectors.

#### *2.6.b Conceptual Framework and Historical Waves of Regionalism*

The conceptual framework of regional freight planning reflects the characteristics of distinct historical periods of regionalism. Wallis (1994b, 2008) divides regionalism into multiple waves. The federal mandate for the decentralization of some transportation planning to metropolitan areas stems from the policy emphasis on regionalism in the 1960s and 1970s. The contemporary focus on governance coalitions embodies the emergence of new regionalism in the 1990s. In many ways MPOs are anachronisms, remnants from a time when the US Government actively supported regional planning activities. The 1960s and 1970s saw numerous federally-sponsored initiatives including the Department of Housing and Urban Development's Sec. 701 comprehensive planning program and A-95 reviews that required area-wide planning (Wallis 1994a, 2008). By 1979, the US Government maintained 39 programs that supported regional planning; in only a few years after President Reagan took office, 38 of those programs were eliminated or drastically changed (McDowell 1984). Regional transportation conducted by MPOs was the only federal regional planning initiative left intact in the early 1980s.

Wallis's (1994b) analysis of regionalism initiatives from the 1960s and 1970s describes many elements of contemporary MPOs. He contends that regionalism efforts from this era relied on "top-down planning mandates, regulations, and the power of the federal

purse” and that their legitimacy stemmed from “data, modeling, and representative councils” (1994b, 449). The problem with this type of regionalism, Wallis argues, is that organizations like MPOs have minimal legitimacy for taking the lead on behalf of regional interests since most MPO authority stems from the US Government. This study’s focus on the implementation of federal transportation policy contingent on oversight and mandates offers an analysis of the contemporary impact of a regionalism model from the 1960s and 1970s.

Additionally, the study’s examination of MPOs within a region-wide context of stakeholders offers an analysis of regionalism through a contemporary approach known as new regionalism. New regionalism emphasizes multi-sector governance, multi-jurisdiction cooperation, partnerships, and coalitions in contrast to previous forms of regionalism that concentrated on structural reforms such as consolidation of multiple jurisdictions (Savitch and Vogel 2000; Wheeler 2002). When regime theory is applied to the regional scale, it shares many characteristics with new regionalism (Hamilton 2004).

## **2.7 Conclusion**

This chapter reviewed the literature on freight transportation planning, planning capacity, federal transportation policy, and the governance of metropolitan regions. The synthesized review was utilized to create a refined set of research questions and a conceptual framework to better understand regional freight transportation planning. The primary hypothesized explanations for variations in MPO freight planning were then discussed. The research questions and conceptual framework from this chapter provide the foundation for this study’s research design, measurement, data collection, and analytical methods.

### **3 Research Design and Methodology**

#### **3.1 Research Design**

To examine the metropolitan freight planning research questions described in Chapter 3, this study adopts a mixed methods sequential explanatory design as delineated by Creswell and Plano-Clark (2007). In this type of design quantitative methods are first employed and then qualitative methods follow to provide a more complete understanding of and expand on the quantitative results. The first stage of research consists of a national study through a survey of all MPOs in the United States. The data from the nationwide study then are analyzed quantitatively through methods including descriptive statistics, regression discontinuity, and multiple regression. Building on the results from the nationwide study, the second stage of research consists of four follow-up case studies focusing on specific regions identified via the survey. Using Yin's (2014) terminology, the case studies follow a holistic, multiple case design. The case studies provide greater contextualization for examining the research questions by collecting data, primarily in the form of interviews, from many different organizations involved in freight transportation. The case study data are then analyzed utilizing qualitative methods with an emphasis on pattern matching.

The research design and methods described in this chapter were chosen to answer the research questions developed in Chapter 2. The following table presents this study's research questions with the associated methods to examine each question. The design and methods are discussed in detail in the following sections. The portion of the research design featuring quantitative methods primarily addresses questions pertaining to Question 1: What are the

effects of federal policy on MPO freight planning capacity? The design focusing on qualitative methods primarily addresses questions pertaining to Question 2: How do freight stakeholder organizations from multiple sectors influence MPO freight planning?

### **3.2 National Study Design and Sample Selection**

In order to examine the effects of federal transportation policy on an MPO's capacity to conduct freight transportation planning the first stage of the research comprised a nationwide survey and analysis of MPO freight planning. The study population for this stage was all 381 MPOs in the fifty US states and the District of Columbia. The 381 MPOs resulted from federal designations based on regional population statistics from the 2000 Census. MPOs with regional populations greater than 200,000 are given an additional designation as a TMA. There are three additional MPOs in Puerto Rico that were not included in the study population.

#### *3.2.a Regression Discontinuity Design*

The research design for the nationwide analysis of MPO freight planning, in addition to allowing for analysis through descriptive statistics and multiple regression, adopts a quasi-experimental design known as regression discontinuity (RD). The manner in which regions get assigned into the two categories of MPOs by the federal government creates a potential discontinuity that can be modeled through this design. Using an RD design tests if larger MPOs' assignment to TMA status is causally related to the outcome variable of freight planning capacity. As the name suggests, the RD design estimates treatment effects through a discontinuity in the regression line between treatment and control groups at a specific cutoff point (Imbens and Lemieux 2008; Shadish, Campbell, and Cook 2002; Trochim 1984, 1990). A primary strength of an RD design is that the researcher can understand and model the

selection process in the units of analysis as assigned to treatment and control. The modeling of the selection process makes RD designs particularly resistant to threats of internal validity.

In an RD design, assignment to treatment and control is based on a cutoff score for a variable. The assignment variable does not need to be related to the outcome of interest, but it should be a continuous variable. In the RD model for this study the assignment variable is the population threshold of 200,000 that is used to determine whether or not an MPO is designated as a TMA. The treatment effect is estimated by the discontinuity in the regression line at the cutoff point. An RD design can be diagrammed as follows (Shadish, Campbell, and Cook 2002, 209):

Figure 3.1 Regression Discontinuity Design

$O_A$	C	X	$O_2$
$O_A$	C		$O_2$

Where  $O_A$  is the measurement on the unit of analysis that will be used for assignment (population of the MPO in 2000)

C shows that the units will be assigned to treatment and control based on the cutoff score

X is the assignment to treatment (TMA)

$O_2$  is the post-assignment measurement on the outcome variable of interest (MPO freight planning capacity)

The RD design is appropriate for this study because the US Government utilizes a population threshold to determine whether an MPO receives the additional TMA designation. The TMA designation was instituted in the 1991 federal surface transportation legislation ISTEA as a means for providing larger MPOs increased levels of authority over project selection, planning requirements, and federal oversight. Both the population thresholds for MPO creation and TMA designation, 50,000 and 200,000 respectively, are arbitrary cutoffs without much theoretical or empirical justification and hence are considered exogenous to the freight planning outcomes of interest.

### 3.2.b Full Study and Regression Discontinuity Populations

While the federal government makes the initial MPO and TMA designations for every urbanized area in the United States, which are then published in the Federal Register (Designation of Transportation Management Areas 2002), states are given the final authority in terms of how the MPOs are defined and established. Some states combine multiple urbanized areas into one larger MPO, such as in Los Angeles. In other states one urbanized area is divided into multiple MPOs such as the Bridgeport—Stamford Urbanized Area, which is split into three MPOs. Because the regression discontinuity design was chosen to model the assignment to treatment, which is the process of the federal government designating MPOs as TMAs, I have only included the MPO with the largest population from urbanized areas representing multiple MPOs. That means that the total number of MPOs is smaller for the RD study population than the total number for the full study population. However, it should be noted that the RD MPO population is a subset of MPOs completely contained within the full MPO population. Table 3.1 summarizes the differences between the two populations, the number of respondents for each, and when each of the populations will be used for analysis.

Table 3.1 Full Study and Regression Discontinuity Populations

	Total MPOs	Respondents (n)	Methods of Analysis
Full MPO Population	381	278	Descriptive statistics; multiple regression; case studies
RD MPO Population	356	261	Regression discontinuity

### 3.3 National Study Data Collection

The survey questionnaire was designed to collect data on the identified measures of freight planning capacity. In addition to these capacity measures, the survey gathered

information on regional freight issues, organizational structure, and relationships with other organizations. Respondents were able to decline to answer any question within the survey. The survey questionnaire also allowed respondents to submit additional thoughts about MPO freight planning. The structure and wording of survey questions were constructed based on the methods of Dillman, Smyth, and Christian (2009). Drafts of the survey questionnaire were shared with transportation professionals, MPO officials, and UNC's Odum Institute for feedback on content, wording, and survey organization. The research plan and survey were submitted to UNC's institutional review board (IRB), which granted an exemption for the project.

Prior to survey administration, a contact database was created with records for all 381 MPOs. For each organization the database contained fields for a contact person and corresponding e-mail address, physical address of MPO, and telephone number. This database was constructed beginning with records culled from an online MPO Database maintained by the FHWA and Federal Transit Administration (FTA). That data was then cross-referenced with information from each MPO's website.

Survey administration included six contacts through multiple channels of communication: one mailed pre-notification letter, one mailed follow-up postcard, and four e-mails. Respondents completed the survey questionnaire on the Internet through a Qualtrics software interface. Survey communication materials were all created following the tailored-design method (Dillman, Smyth, and Christian 2009). The national survey was branded the "National Freight Planning Study" and included a commissioned logo. The logo was used consistently in all communication materials to graphically connect each communication effort to the overall study. The survey instrument is included in Appendix B.



All survey responses were received between June 20 and August 20, 2012. In total, 278 MPOs submitted a completed survey for a response rate of 73 percent. The survey response rate compares favorably with other national surveys of MPOs, outperforming most other studies in terms of response rate except for one conducted by the GAO (see Table 3.2).

Table 3.2 National Surveys of MPOs with Associated Response Rates

Year	Organization	Study Focus	Responses	Total Surveyed	Response Rate
2012	Marc Howlett	Freight	278	381	73%
2003	AMPO	Freight	136	340	40%
2007	AASHTO / FHWA	Freight	-	-	22%
2009	GAO	Transportation Planning	327	381	86%
2010	CUTR / FHWA	Administrative Capacity	133	374	36%
2013	Georgia Tech / US DOT	Megaregions	194	384	51%

\*Note: the 2007 AASHTO / FHWA survey did not report the number of responses

### 3.4 National Study Methods of Analysis

#### 3.4.a Descriptive Statistics

MPO survey responses were initially analyzed through descriptive statistics. These statistical methods included measures of central tendency, cross tabulations, and graphical representations such as histograms.

#### 3.4.b Regression Discontinuity

The data from the national survey were then analyzed using a regression discontinuity design to test the causal relationship between assignment to a TMA and MPO freight planning capacity. Covariates were added to the general RD model to control for potential bias (Imbens and Lemieux 2008; Trochim 1984). The RD model with covariates is written as follows:

$$y_i = \beta_o + \beta_1 Z_i + \beta_2 (x_{popi} - x_c) + \vec{\beta} X_i + \varepsilon_i$$

$y_i$  is the outcome variable – an index of MPO freight planning capacity;  
 $\beta_o$  is the constant;  
 $\beta_1$  is the effect of assignment to treatment (ie: the effect of TMA designation assignment);  
 $Z$  is a dummy variable signifying if the unit was assigned to treatment (1=TMA) or to control (0=non-TMA MPO);  
 $\beta_2$  is the regression coefficient predicting the outcome variable from the assignment variable (MPO population). This can be interpreted as how the outcome changes with population;  
 $(x_{popi} - x_c)$  subtracts the cutoff value ( $x_c = 200,000$ ) from the assignment variable (MPO population in year 2000 for unit  $x_i$ ), thereby centering the assignment variable;  
 $X_i$  is a vector of covariates and  $\vec{\beta}$  is a vector of estimated coefficients;  
 and,  $\varepsilon_i$  is the error term.

Modeling the correct functional form is very important in regression discontinuity designs because the treatment effect is estimated through the discontinuity at the cutoff. If the functional form is not modeled correctly, this presents the potential problem of statistical conclusion validity of finding an effect when one does not exist (Shadish, Campbell, and Cook 2002, 230-237). One method for modeling functional form in RD models is to restrict the units to specific bandwidths around the cutoff, which allows for local regression and minimizes the potential for MPOs with populations far away from the cutoff to bias discontinuity estimates (Imbens and Lemieux 2008). The regression discontinuity models presented in Chapter 5 include all MPOs, MPOs with fewer than one million people, a bandwidth 150,000 around the cutoff, and a bandwidth of 100,000 around the cutoff.

Additional approaches to adjusting for functional form include accounting for non-linearity and interactions between assignment and treatment variables. When modeling functional form in RD designs, the literature often suggests overfitting the model (Shadish, Campbell, and Cook 2002; Trochim 1984). Although several polynomials of grades greater than two were tested, the final regression discontinuity models included a squared term for

population to adjust for the non-linear distribution of population in MPO regions. This final RD model is written as follows:

$$y_i = \beta_o + \beta_1 Z_i + \beta_2 (x_{\text{pop}i} - x_c) + \beta_3 (x_{\text{pop}i} - x_c)^2 + \vec{\beta} X_i + \varepsilon_i$$

### 3.4.c Multiple Regression

In addition to the regression discontinuity analysis, which was employed to model the federal policy process of TMA designation, the data from the nationwide study were analyzed using the statistical method of multiple regression. By relaxing the assumptions and requirements of the RD models including the incorporation of variables related to assignment, the multiple regression models allow for a broader examination of predictors of MPO freight planning capacity. For example, the RD model requires the inclusion of the MPO's urbanized area population from the 2000 Census because this is the figure that determines TMA designation. In the multiple regression models, the 2010 population for the entire geographic area of the MPO may be used. In contrast to RD, which is explicitly a causal model, the predictors of MPO freight planning capacity in the cross-sectional multiple regression models are associations. The general form of a multiple regression model can be written as follows:

$$y_i = \beta_o + \vec{\beta} X_i + \varepsilon_i$$

where  $X_i$  is a vector of explanatory variables. Explanatory variables for this study are discussed in section 3.5.b.

## 3.5 National Study Variables and Measurement

### 3.5.a Outcome Variables

A central aim of this study is to measure an MPO's organizational capacity to conduct freight planning. While planning capacity and transportation planning capacity have received

significant attention, the methods and measures to assess an organization's planning capacity remain unclear. Many of the measures that have been utilized in the literature have often been relatively basic such as utilizing the number of planners that work on a specific project. The broader organizational capacity literature includes a spectrum of types of organizational capacity. Based on the literature review conducted for this study, I devised a multi-item measure of freight planning capacity that is discussed in the following two sections.

#### *3.5.a.1 MPO Freight Planning Capacity Indicators*

The ability of an MPO to conduct freight planning is operationalized as MPO freight planning capacity. This outcome variable is measured through indicators corresponding to components of freight planning capacity: administrative capacity, networking capacity, technical capacity, and plan-making capacity, an approach that is consistent with how Glickman and Servon (1998, 2003) have measured capacity, as reviewed in Chapter 2. These indicators are presented in Table 3.3. These indicators were then standardized by transforming the observed values into corresponding z-scores.

Table 3.3 Components of Index of MPO Freight Planning Capacity

Indicator by Capacity Type	Variable Type	Range
<i>Administrative Capacity</i>		
Freight staff	Continuous	0 - $\infty$
NHI freight training	Dichotomous	0, 1
Freight importance to MPO	Ordinal	0,4
<i>Networking Capacity</i>		
Freight on policy board	Dichotomous	0,1
MPO on freight taskforce	Dichotomous	0,1
Freight communication with state DOT	Ordinal	0,4
Freight communication with business organizations	Ordinal	0,4
<i>Technical Capacity</i>		
Collect heavy truck data	Dichotomous	0,1
Collect freight rail data	Dichotomous	0,1
Freight in travel demand model	Ordinal	0,3
<i>Plan-making Capacity</i>		
Freight in LRTP	Ordinal	0,3
MPO freight plan	Dichotomous	0,1
MPO conducted freight study	Dichotomous	0,1

### 3.5.a.2 MPO Freight Planning Capacity Index

To create an index of MPO freight planning capacity, z-scores for the freight planning capacity indicators were summed for each responding MPO and divided by the total number of responses for that MPO. Dividing the summed z-scores by the total number of responses was performed to adjust for the few respondents that had missing indicator values because of survey item non-response. An index comprised of summed z-scores has been used in the urban planning literature to measure walkability (see Frank et al. 2010). The resulting index weights all indicators evenly and places the observations on the same scale. The index's equation is written as:

$$\text{MPO freight planning capacity index} = \sum_i^n \frac{x_{zi}}{n} \text{ where } x_{zi} = N(0, 1): x_i$$

and n is the number of items (questions) in the index and x is the response to item i for each responding MPO.

### 3.5.b Explanatory Variables

The explanatory variables for the analysis of MPO freight planning capacity were identified through the Chapter 2 literature review. The treatment and assignment variables refer to the regression discontinuity design used to test the effects of federal MPO designation on MPO freight planning capacity.

Table 3.4 Explanatory Variables and Regression Discontinuity Variables

	Variable Type	Source
<i>RD Treatment Variable</i>		
TMA designation	Dichotomous	Census 2000, Federal Register
<i>RD Assignment Variable</i>		
UZA Population, 2000	Continuous	Census 2000
<i>Explanatory Variables</i>		
MPO population, 2010	Continuous	Census 2010
Pct. of US pop. within 500 miles	Ratio	Census 2010
Area (square miles)	Continuous	Census 2010
Interstate	Dichotomous	National Transportation Atlas Database 2012
Federally-designated intermodal connector	Dichotomous	National Transportation Atlas Database 2012
Class 1 railroad	Dichotomous	National Transportation Atlas Database 2012
NAAQS non-attainment	Dichotomous	US EPA 2012
Daily truck miles traveled (TMT) on National Highway System (NHS)	Continuous	Freight Analysis Framework 2007

### 3.6 Case Study Design and Sample Selection

This study employs a sequential mixed methods research design (Creswell and Plano-Clark 2007) to gain a better understanding of the quantitative results and also provide greater contextualization by collecting data from multiple sources. Whereas the national survey and subsequent quantitative analysis focused on federal policy and the role of MPOs in regional freight planning, the qualitative case study analysis expanded the analysis to include

organizations from multiple sectors when it comes to regional freight planning. The study of organizations, companies, and entities from multiple sectors required the collection of data directly from those organizations.

A second important component of the sequential mixed methods research design is to incorporate findings from the first qualitative stage into the design and development of the second quantitative stage. As detailed in Chapter 6, one explanation for variations in MPO freight planning that emerged from the quantitative analysis was the correlation between an MPO's identification of a regional freight champion in their survey response and higher levels of MPO freight planning capacity. This potential explanation corresponded to existing theory from the literature review that stressed the importance of champions and coalitions in regional governance.

### *3.6.a Case Study Design*

The research design employed stage of the dissertation was the multiple case-study design that “predicts contrasting results” for “anticipatable reasons” (Yin 2014, 54). The theoretical frameworks of urban regime theory and political economy provide the theoretical foundations for the case study design and methods.

### *3.6.b Case Selection*

Whereas the study population for the first stage of this study was all MPOs within the United States, the second stage required data collection from a diverse group of organizations in a small number of regions. Building on results from the first stage of the study, the identification or not a regional freight champion was chosen as a central variable for case study design and analysis.

For case study selection, I utilized purposive sampling that combined case study sampling methods of matched cases and great variation on key variables of interest (Neergaard 2007). The two variables of interest were identification of a regional freight champion by an MPO (yes/no) and an MPO's freight planning capacity (high/low). The identification of a regional freight champion by an MPO came directly from the survey questionnaire. For theoretical reasons, to meet this selection criterion the MPO had to identify a regional freight champion that was an organization external to the MPO.<sup>5</sup> High and low capacity were operationalized as MPOs that had freight capacity index score greater than one standard deviation away from the mean capacity score. Because MPO freight planning capacity is generally correlated with population, cases meeting the selection criteria were organized into groups with similar regional populations as a research design control. From the 278 MPOs who responded to the survey, a total of 82 MPOs met the case study selection criteria (see Table 3.5).

Table 3.5 Total Eligible Cases by Selection Criteria

	No champion	Yes champion
High capacity	12	25
Low capacity	40	5

Through a visual analysis of the cases meeting the selection criteria, I chose a grouping of cases with 2010 MPO regional populations between 500,000 and one million. This grouping is interesting from both a theoretical and policy standpoint because previous studies (e.g. Bond, Kramer, and Seggerman 2010) suggest that this is the population range where MPOs begin developing staff specializations including freight planning.

Medium-sized MPOs are understudied. Research on MPOs often focuses large

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<sup>5</sup> For example, an MPO that identified itself as the regional freight champion was excluded from the selection sample because of the research design's focus on the relationships between MPOs and other organizations.



metropolitan areas with populations greater than one million (e.g. Handy and McCann 2011; Lowe 2014). In their study of MPO freight planning acknowledged that organizations with large populations generally have the most advanced freight planning programs, but that “An MPO does not have to be large to have an effective freight committee or overall freight planning process” (Schank, Hirschman, and Elliott 2008, 16). To support this claim, the authors cited the work of Orlando’s MPO. However, the Orlando MPO in 2010 had jurisdiction of a metropolitan area with more than 1.8 million people; only twenty-six of the other 380 MPOs had larger regional populations (US DOT 2012). MPO research skews very large.

The final case sample consisted of Greenville, South Carolina; Fort Myers, Florida; Honolulu, Hawaii; and Grand Rapids, Michigan (see Table 3.6). The selected cases were restricted to MPOs whose primary city was the largest population center in the greater metropolitan region. That requirement excluded MPOs with regions adjacent to much larger cities such as Vancouver, Washington that borders Portland, Oregon.

Figure 3.2 Grouping of Medium-sized MPOs Meeting Selection Criteria

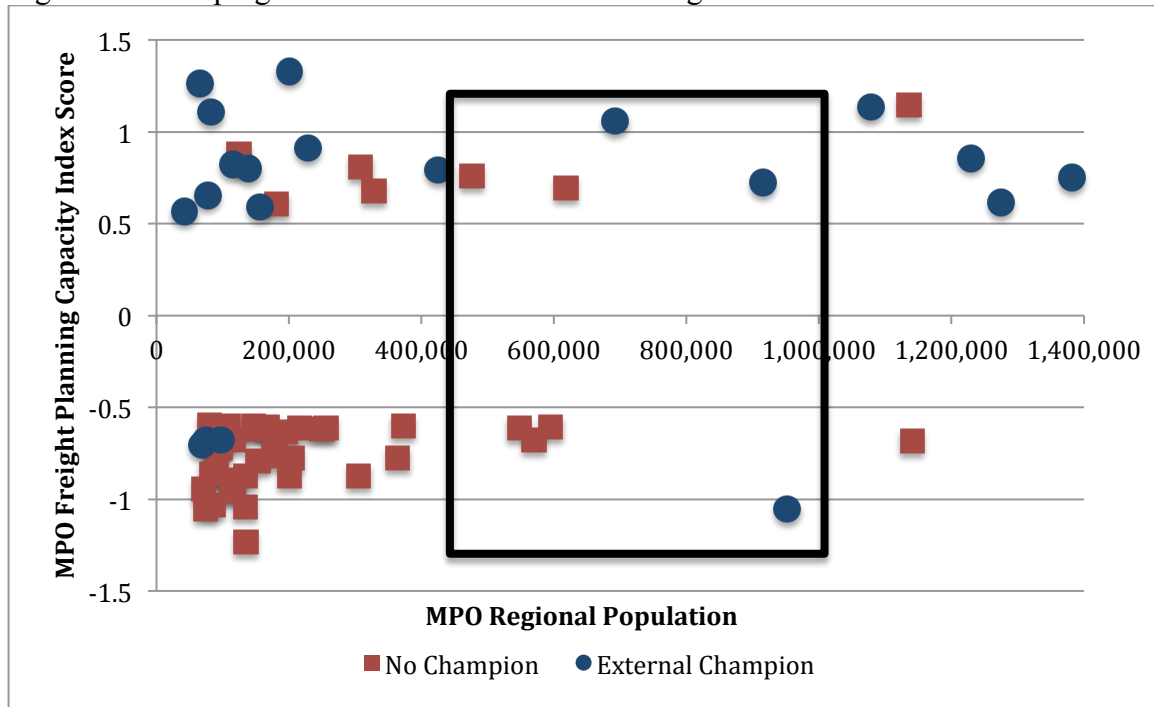


Table 3.6 Final Case Study Sample

	No champion	Yes champion
High capacity	Fort Myers, FL	Grand Rapids, MI
Low capacity	Greenville, SC	Honolulu, HI

### 3.7 Case Study Data Collection

#### 3.7.a. Interview Guide and A-Scheme

The case study interviews followed a semi-structured format providing consistency of questions across respondents while also allowing for the collection of information specific to a geographic area or organization. The structure and questions during the interviews were based on a type of interview guide known as an A-Scheme (Aspers 2004, 2009), which is developed from a set of themes derived from theory and empirical work. I created two interview guides in the form of A-Schemes based on respondent type: one for MPOs and the second for other organizations. Both A-Schemes are presented in Appendix C.

### *3.7.b Interview Sample*

The interview sample for each case consisted of key freight stakeholders representing organizations from multiple sectors (e.g. public, private, non-profit, quasi-governmental). If an MPO identified a regional freight champion, that organization was a critical component of the interview sample. Key stakeholders were identified from local newspaper articles about freight transportation, transportation studies, and MPO documents. During interview scheduling and administration, I also asked for recommendations of other freight stakeholders to interview, a method known as snowball sampling.

### *3.7.c Pilot Case Study Interviews*

I conducted pilot case study interviews in Greensboro, North Carolina prior to beginning case study data collection. Greensboro was chosen because it has a regional population similar to the four cases. The pilot case study interviews were all conducted in-person in early June 2014. The organizations that participated in the pilot study represented multiple sectors: an MPO (public), an airport authority (quasi-public), and a trucking company (private). A non-profit organization representing business interests declined to be interviewed. The pilot study helped refine the process of interview administration including procedures for contacting organizations as well as the wording of the interview questions.

### *3.7.d Case Study Interviews*

In the summer of 2014, I completed field visits to all four case study regions. The purpose of these field visits was to gather data for the case study analyses, particularly through interviews. Prior to the field visits, I contacted stakeholders involved in freight transportation from multiple sectors to schedule interviews. All interviewees consented to participation following protocol approved by UNC's IRB for the protection of human

subjects. For all interviews I took detailed handwritten notes. When possible, I recorded the interviews using a portable device. For interviews that were not audio recorded, upon leaving the interview site I recorded my initial thoughts, reactions, and recollections via the audio recording equipment. Additional phone interviews were conducted after returning to the field. In total, I completed three interviews for the pilot case study and 36 interviews for the four cases (see Table 3.7).

Table 3.7 Summary of Case Study Interviews

Case Number	Case Region	Total Interviews
Pilot	Greensboro, NC	3
1	Greenville, SC	12
2	Fort Myers, FL	9
3	Honolulu, HI	8
4	Grand Rapids, MI	7

### 3.7.e Documentary Data Collection

The collection of documentary evidence supplemented the data gathered via the in-person and phone interviews. The primary source of documentary data consisted of plans and studies conducted by the MPO. These documents were generally available through each MPO's website. In specific instances, MPO officials provided additional documents upon request. For the other organizations, I collected annual reports when available. Some organizations also provided reports or studies they had completed.

I also gathered articles from local and regional newspapers. For each region, I conducted keyword searches in their major newspapers and also business newspapers if available. The searches focused on terms such as "freight transportation," "trucking," or "air freight." If there was a specific project or plan pertaining to the region's major freight issues,

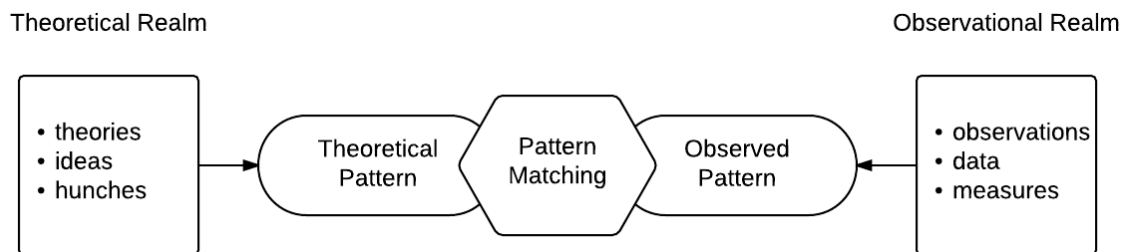
such as the inland port in Greenville, South Carolina, those terms were included in my newspaper searches.

Publicly available information provided by the federal government offered additional background information and also allowed for a standardized source of data to make comparisons between regions. These forms of information included demographic data from the US Census, labor statistics from the Bureau of Labor Statistics, and freight data from the FHWA.

### 3.8 Case Study Analytical Methods

The methods for the qualitative case study analysis follow the work of Yin (2014) and particularly the method of pattern matching. The pattern matching analytical method “compares an empirically based pattern...with a predicted one” that was made prior to data collection (Yin 2014, 143). Building off the research questions in Chapter 2, the case studies focus on the hypothesis that an MPO’s participation in a regional freight coalition or regime leads to higher levels of freight planning capacity. Empirical data from the case studies form an observed pattern, which is then tested against the theoretical pattern to see if, how, why, and to what extent the expected and observed patterns match. The pattern matching analytical method is graphically depicted in Figure 3.4.

Figure 3.3 Pattern Matching Analytical Method



\*Note: Simplified and modified from Trochim (1989)

The pattern matching form of data analysis corresponds with the methods used by Stone (1989) in his examination of Atlanta's urban regime. In his section on methodology, Stone states that his evidentiary analysis relied on finding "patterns of detail" (Stone 1989, 255). The pattern matching method is strengthened by triangulating data from multiple sources. Documentary evidence was utilized to confirm information gained from the interviews as "for case study research, the most important use of documents is to corroborate and augment evidence from other sources" (Yin 2014, 107)

### **3.9 Potential Threats to Validity**

Threats to validity in this study have been identified and efforts have been made to address these potential limitations. The limited empirical and theoretical literature on freight planning within the field of urban planning compounds these challenges. The sequential mixed methods explanatory design was chosen in part to address validity concerns.

#### *3.9.a Construct Validity*

Construct validity and measurement error present challenges throughout the study and analysis. Organizational capacity is a widely used and rarely defined term. The federal government, for example, has both a transportation planning capacity building program and a freight planning capacity building program but does not offer concrete examples of what constitutes transportation planning capacity or freight planning capacity. Additionally, the measurement, variable selection, and creation of the index of MPO freight planning capacity may not adequately represent the construct being studied. As this is the first study to create a multiple-item measurement of freight planning capacity it is reasonable to ask how closely the index of MPO freight planning capacity represents an MPO's ability to conduct freight planning. Many of the indicators of freight planning capacity were structured as binary or

ordinal measures, which helped lower respondent burden and facilitated comparisons, but resulted in less-nuanced measures of those capacity indicators.

The case study research allowed an evaluation of the data collected via the national survey as well as analyses of that data such as the index of MPO freight planning capacity. The case study selection criteria, the identification of a regional freight champion and high or low freight planning capacity, came directly from the survey. I completed interviews with seven different MPOs during this study and the freight planning capacity scores from my index corresponded to the realities of MPO freight planning.

### *3.9.b Internal Validity*

The regression discontinuity design is considered to be particularly robust to internal validity threats because the process of selection into treatment and control groups is known and modeled. The RD design for this study models the effects of assignment to treatment, which is the designation of an MPO as a TMA. Maintaining the strict population threshold and adherence to the cutoff is the reason why the population of MPOs for the RD analysis was restricted in the instances where one urbanized area was split into multiple MPOs.

The potential for interference with the cutoff is one of the central concerns in regression discontinuity designs. For this study a potential rival explanation would be that there is something else occurring when an MPO's region reaches 200,000 people that would account for differences in MPO freight planning capacity. This type of threat is unlikely. A larger concern is that the 2010 Census had already occurred at the time of the national survey. Some MPOs had regions that crossed the 200,000 person threshold during the intervening decade between censuses. And although the new TMA designations had not yet been made in the summer of 2012, some MPOs had begun process of transitioning to TMA

status.<sup>6</sup> These effects may be modeled statistically through the creation of a dummy variable. Additionally, if TMA designation is important to MPO freight planning capacity, the ten-year difference between MPOs that had been designated based on the 2000 Census and those from the 2010 Census should be large enough to reveal statistical differences.

The potential for omitted variable bias is present throughout the first stage of research and the ensuing quantitative analysis. From the theoretical framework posited in Chapter 2, the primary omitted variables would relate to the influence of the state department of transportation on MPO freight planning capacity. The case study research and interviews were undertaken with the understanding of this limitation. The interviews contained multiple questions about the work of state DOTs and their relationships with MPOs. I also interviewed at least one transportation planner from three out of four state departments of transportation.

The analytical methods employed during the second stage of research help reduce threats to internal validity from the case study research. These methods include pattern matching and triangulation. The robustness of these methods results from utilizing multiple and independent sources of data. Rival explanations for my research questions should be explicitly stated and then ruled out. Pattern matching and triangulation both support the inferences being made about regional freight planning.

### *3.9.c External Validity*

The sample of MPOs from the first stage of study were not randomly selected. As the sample consisted of MPOs responding to my survey, concerns exist about generalizing the results to non-responding MPOs. In particular, it can be hypothesized that non-responding

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<sup>6</sup> The MPO for Roanoke, Virginia, for example, announced the anticipated change to TMA status on its website and specified some steps being taken to for the upcoming transition.



MPOs would be generally less interested in and less experienced with freight transportation. Study results show that most MPOs have limited freight planning capacity. As the study sample underrepresents smaller MPOs and likely those with less freight planning experience, results from this study about the prevalence of freight transportation planning would be biased upwards by overestimating aggregate MPO freight planning capacity. Because of this potential bias, overall levels of MPO freight planning capacity are likely even lower than indicated by this study's results.

Applying the findings from the second stage of research directly to other MPOs should be done with caution. The MPOs in the case studies are in regions with populations between 600,000 and one million that are not adjacent to a larger city. Following Yin (2014), one of the central purposes of case study research is to generalize research findings to theory in contrast to a statistical generalization to a larger population. With urban regime theory as the theoretical foundation for the second stage of this study, findings from the study may be used to inform if and why a regional freight champion influences an MPO's capacity to conduct freight planning.

#### *3.9.d Statistical Conclusion Validity*

Statistical conclusion validity represents another concern in the quantitative analysis of MPO freight planning capacity. Linear regression may not be the optimal statistical method for examining the relationship between explanatory and outcome variables. Regression models require continuous outcome variables, and the freight planning capacity index was largely constructed from binary and ordinal variables. The process of standardizing the indicators into z-scores helps transform the indicators of freight planning

capacity into a more continuous variable, but concerns about statistical conclusion validity remain.

Mono-method bias is potentially problematic in that one method, the national survey, was used to create each MPO's freight planning capacity index score. The lack of multiple sources in creating the capacity index makes these measures more susceptible to respondent bias.

Regression diagnostics were performed for the statistical models including assessments of multicollinearity and heteroskedasticity. Diagnostics did not indicate substantial issues. Some of the observations such as the MPOs for New York and Los Angeles were quite influential. However, population bands around the cutoff in the regression discontinuity models were employed, in part, to address issues with influential variables.

## **4 Results from a National Survey of MPO Freight Planning**

This chapter presents descriptive statistics from a national survey of MPO freight planning conducted in 2012. The chapter begins with an overview of MPOs in terms of their numbers, population, and geographic location and then compares the characteristics between responding and non-responding MPOs. The primary freight issues facing metropolitan regions in the United States as well as the motivations for MPOs to conduct freight planning are then presented. Survey responses that provide information on the resources, capabilities, and activities that relate to MPO freight planning are then described. These measures can be categorized within the following types of planning capacity: administrative, networking, technical, and plan-making. The individual measures are then combined into an index that provides an overall measure of MPO freight planning capacity. The index scores are presented and discussed, especially as they relate to regional population. The index is used extensively in Chapter 5 in assessing determinants and predictors of MPO freight planning capacity. The chapter concludes with a discussion of nationwide trends in MPO freight planning and compares results from this survey with previous studies of MPOs.

### **4.1 Characteristics of MPOs**

This section provides an overview of all 381 MPOs in the United States with an emphasis on regional population. After the summary characteristics of all MPOs are presented, the similarities and differences between responding and non-responding MPOs are then discussed. All data pertaining to MPOs in sections 4.1a and 4.1b derive from sources external to the survey.

#### *4.1.a Variations in MPO Regional Population*

In 2012, when the MPO freight planning survey was administered, there were 381 MPOs with at least one MPO representing portions of every state and the District of Columbia.<sup>7</sup> MPOs were established in the 1960s and 1970s by Congress to conduct urban transportation planning in the United States, and every urbanized area with more than 50,000 people must be represented by an MPO. The amount of people living in metropolitan areas in the United States is large. Although MPOs cover only 11 percent of US land area, 78 percent of the country's population lives in these regions.<sup>8</sup>

Policies and legislative mandates mostly apply to MPOs in a uniform manner with the notable exception of MPOs with regional populations exceeding 200,000 that receive an additional designation as a TMA. The TMA designation brings additional authority and responsibilities that were discussed extensively in Chapter 2.

Despite similar policy mandates, MPOs are quite diverse in terms of metropolitan size. In 2010, 49 percent of all MPOs were home to fewer than 200,000 people; 75 percent of MPOs represent regions with populations under 500,000. And yet, some MPOs represent very populous areas with several million or more residents. As Table 4.1 shows, the majority of people living in regions represented by MPOs are concentrated in large metropolitan areas. MPO regional population follows an exponential distribution and this great variation potentially challenges the implementation of federal transportation policy as MPOs with the same policy mandates plan for drastically different regions. Because of the regional

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<sup>7</sup> This study excludes the three MPOs located in Puerto Rico. Additional MPOs have since been created based on results from the 2010 US Census.

<sup>8</sup> Calculated by the author with data from Bond, Kramer, and Seggerman (2010) and US DOT (2012).

population variation, many of the survey results are presented in this chapter with MPOs grouped into Small, Medium, and Large tiers based on their metropolitan population.<sup>9</sup>

Table 4.1 Number and Population of MPOs by MPO Size, 2010

MPO Size	Population Range	Number of MPOs	Pct. of Total	Total Population	Pct. of Total
Small	Less than 200,000	186	49%	21,350,498	7%
Medium	200,000 to 1 Million	147	39%	64,316,959	21%
Large	Over 1 Million	48	13%	155,509,178	64%

\*Table for all MPOs and not just survey respondents; source US DOT (2011, 2012)

#### 4.1.b Comparison between Responding and Non-responding MPOs

Because they are federally-designated entities, uniform data is available to facilitate comparisons between the 278 responding and 103 non-responding MPOs. MPOs that responded to the survey have on average much larger regional populations than non-responding MPOs. The difference in mean regional population suggests that the survey sample contains a disproportionate number of larger MPOs relative to non-respondents (see Table 4.2).

The exponential distribution of regional population also lessens the effectiveness of t-tests that rely on means in determining significant differences between groups. Using median regional population as the measure of central tendency shows much less difference between groups. While responding MPOs still have a higher median population than non-responding MPOs, the difference is not statistically significant as tested by the Mann Whitney U Test.

<sup>9</sup> The division of MPOs into three groups based on population thresholds of 200,000 and one million is a common way of presenting information and analysis on MPOs (e.g. GAO 2009). The 200,000 population number has policy relevance because that is the threshold for used for establishing TMA status. During previous surface transportation reauthorization efforts there have also been some attempts to increase the baseline population for MPOs from 50,000 to 200,000. The one million population number, while commonly used in analysis, to date has not had much relevance to federal MPO policy.

Table 4.2 Comparisons between Responding and Non-responding MPOs

All responding and non-responding MPOs (n = 381)				
Key Characteristic	Statistic	Responding MPOs (n=278)	Non-Responding MPOs (n=103)	Significant Difference?
MPO population, 2010	Mean	709,512	426,527	Yes <sup>a**</sup>
MPO population, 2010	Median	213,013	191,906	No <sup>b</sup>
TMA Designation, 2000	Proportion	40.6%	39.8%	No <sup>c</sup>
MPO Area, 2010 (Sq Mi)	Mean	1,197	973	No <sup>a</sup>
Year MPO designated	Median	1977	1975	No <sup>b</sup>
NAAQS non-attainment status, (2011)	Proportion	40.3%	44.7%	No <sup>c</sup>
Daily VMT on NHS	Mean	8,010,980	5,056,425	Yes <sup>a*</sup>
Daily TMT on NHS	Mean	867,995	640,807	No <sup>a</sup>
Interstate miles	Mean	68	45	Yes <sup>a***</sup>
Intermodal connector	Proportion	59.4%	44.7%	Yes <sup>c**</sup>
Class 1 railroad	Proportion	83.5%	81.6%	No <sup>c</sup>
Amtrak station	Proportion	47.1%	41.7%	No <sup>c</sup>

Notes: \* p<0.1; \*\* p<0.05, \*\*\* p<0.01; all significance tests are two-tailed

Calculations by author based on data from US DOT (2011, 2012) and US EPA (2014)

<sup>a</sup> Independent two-sample t-test with unequal variances

<sup>b</sup> Mann-Whitney U Test

<sup>c</sup> Two-group test of proportions

The 278 MPO study population is generally similar to the 103 non-respondents with a main difference being that larger MPOs were more likely to respond to the survey than MPOs in smaller regions. The relative overrepresentation of smaller MPOs is common in national studies of MPOs (e.g. Bond, Kramer, and Seggerman 2010). Since MPOs in larger regions are expected to have higher levels of freight planning capacity than their less populous counterparts, the results could overstate the importance and integration of freight into MPO transportation planning. Based on the characteristics of responding and non-responding MPOs, the generally low levels of MPO freight planning capacity presented in the following sections would likely be even *lower* if all 381 MPOs had responded to the survey.

MPOs responding to the freight planning survey were widely distributed throughout the country. In all, survey respondents included MPOs in 49 states and the District of Columbia. There are few discernable patterns in the geographic distribution of respondents and non-respondents (see Figure 4.1). One potential pattern is the clustering of non-respondents in California's Central Valley. Overall, MPOs in California tended to respond at lower rates than their counterparts in other states. Transportation and MPOs are studied extensively in California, and it is possible that these entities experience some fatigue in regards to participating in studies.

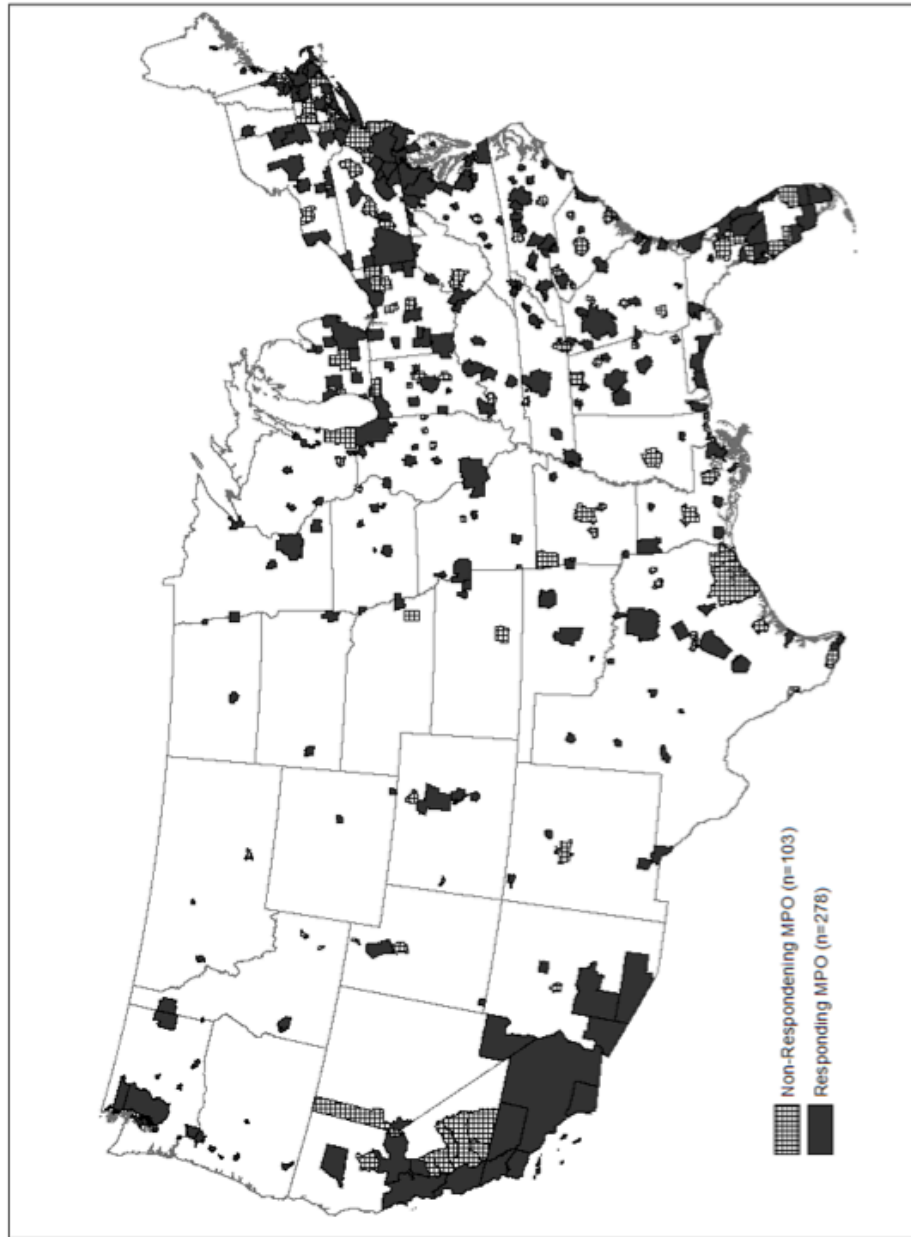
## **4.2 Metropolitan Goods Movement: Issues and Planning Motivations**

The emphasis of the chapter now shifts to present results and findings from the study population of 278 responding MPOs. This first section reports and assesses the main freight issues in metropolitan areas as well as the primary reasons for an MPO to conduct freight planning. Unless otherwise noted, the survey results presented in the following sections derive from responses to specific questions from the survey instrument. The complete survey instrument may be found in Appendix B.

### *4.2.a Metropolitan Freight Issues*

MPO survey responses demonstrate that US metropolitan regions face a wide variety of issues related to freight transportation. There are few freight issues consistent across the broad spectrum of MPOs. When asked to identify all of the primary freight issues in their MPO's region, only two issues were selected by more than half of all MPOs: infrastructure maintenance and highway congestion (see Table 4.3). Almost two-thirds of respondents identified infrastructure maintenance as a primary freight issue. The emphasis on maintenance perhaps reflects a shift in US metropolitan transportation planning from a post-

Figure 4.1 Geography of MPOs in 2012 by Survey Respondent Type



\* The two MPOs in Alaska and the one in Hawaii responded to the survey.



World War II focus on system expansion to maintenance of an aging system with widespread needs for repair.

Table 4.3 Main Freight Issues Facing Metropolitan Regions (n=276) <sup>10</sup>

Issue	Percent of MPOs
Infrastructure maintenance	63%
Highway congestion	57%
Intermodal connections	49%
Lack of freight infrastructure	33%
Railroad congestion	25%
Local delivery	21%
Other issues	18%
Lack of freight volumes	18%
Marine port dredging	14%
Marine port congestion	6%
No important freight issues	3%
Airport congestion	3%

\*respondents selected all issues applying to their region

The 1991 federal transportation legislation ISTEA ostensibly initiated a new epoch of multimodal transportation planning, but survey responses indicate that highways and automobiles remain the primary modal focus for MPOs, at least in terms of the movement of goods. Although issues pertaining to the four primary freight transportation modes – highway, rail, marine, and air – were all included in the survey instrument, highway concerns greatly surpassed other modes in response frequency. It should be noted that the presence of rail, marine, and air freight infrastructure is generally less common than highway infrastructure although, as Table 4.2 shows, over 80 percent of MPOs have a Class 1 railroad presence in their region. The responses do indicate a concern for creating a more modally-

<sup>10</sup> While 278 MPOs fully-completed the survey, some respondents chose not to answer individual questions resulting in n's of different sizes. The number of respondents for each question will be provided in its corresponding table.

integrated freight transportation system in that just under half of MPOs selected intermodal connections as a primary issue.

The freight issues confronting US metropolitan regions tend to be localized. Survey responses indicate that some regions face crippling congestion related to goods movement while others encourage greater freight volumes. Many respondents specified additional freight issues to those included in the survey instrument. MPOs located near Canadian and Mexican borders frequently cited difficulties with transborder freight transportation. Other issues included conflicts between freight and bicyclists, steep grades, problems caused by winter weather, insufficient river lock size, and being a pass-through region for freight movements. The often-localized nature of regional freight issues poses complications for federal freight planning policy and suggests a need for flexibility in addressing regional freight issues.

#### *4.2.b Motivations for MPO Freight Planning*

While freight issues tend to vary between regions, survey responses demonstrated much greater consensus in terms of motivations for MPO freight planning. The vast majority of MPOs selected two motivations – economic development and freight mobility – as reasons to plan for urban and regional goods movement (see Table 4.4). These twin motivations signal the policy assumption that freight transportation planning can spur regional economic growth by increasing freight mobility. Concerns about employment, the economy, and regional competitiveness appeared frequently in survey responses. One respondent, in addition to selecting economic development, wrote in the planning motivation of "jobs, jobs, jobs."

Table 4.4 Primary Motivations for MPO Regional Freight Planning (n=276)

Motivation	Percent of MPOs
Economic development	87%
Freight mobility	80%
Safety and security	43%
Land use	37%
Air quality	31%
Regulatory requirements	17%
Environmental justice	9%
Other motivations	8%
No important motivations	3%

\*respondents selected all motivations applying to their region

Somewhat surprisingly, the minimization of adverse impacts relating to environmental issues was not commonly identified as a primary motivation for conducting regional freight planning. Although air quality has traditionally been associated with transportation planning and federal transportation policy (Wachs and Dill 1999), fewer than one-third of MPOs included this factor in their list of freight planning motivations. Nationally, 40 percent of MPOs serve regions that were in non-attainment status for at least one criteria pollutant in 2011.<sup>11</sup> For MPOs in non-attainment regions, less than half indicated that air quality was a primary motivation for conducting freight transportation planning.

Environmental justice ranked last of the specific freight planning motivations included in the survey instrument with fewer than one in ten respondents selecting this item. This finding is surprising because of the requirement to incorporate environmental justice into transportation planning for any project utilizing federal funds (Weiner 2013). Additionally, in 2011 seventeen federal departments and agencies signed an interagency Memorandum of Understanding (MOU) on environmental justice. The 2011 MOU was the

<sup>11</sup> Five criteria pollutants in this analysis were 8 hour ozone (1997 standard), 8 hour ozone (2008 standard), lead (2008 standard), particulate matter pm-25 (1997 standard), and particulate matter pm-25 (2008 standard). Data from US EPA (2014).

first major effort of the cabinet-level Interagency Working Group on Environmental Justice in over a decade and specified “goods movement” as one of three focus areas (US EPA 2011; US GSA 2013). In terms of the low frequency for selecting environmental justice, some regions might not have pressing concerns about the effects of goods movement on minority and disadvantaged populations. However, with freight considered to have widely distributed benefits with highly localized costs and with many minority populations living in close proximity to freight facilities (US DOT 2013), the peripheral status of environmental justice in metropolitan freight remains an unexpected finding from the national survey.

### **4.3 Freight Planning Capacity at MPOs**

One of the central purposes of the national survey was to obtain a comprehensive view of the freight planning resources, capabilities, and experiences at MPOs. Questions in the survey instrument were crafted to assess the state of practice of MPO freight planning as well as develop a better understanding of MPO freight planning capacity through the creation of a multi-item index. The following sections present results directly related to MPO freight planning organized by forms of organizational capacity. The freight planning capacity subtypes are administrative capacity, networking capacity, technical capacity, and plan-making capacity.

#### *4.3.a MPO Organizational Structure and Staffing (Administrative Capacity)*

Federal transportation policy allows for great flexibility in the organizational structure of MPOs. The most common organizational arrangement is the integration of the MPO into a regionally-focused organization such as a regional council or council of governments (COG). Trends emerge when examining MPO organizational structure by metropolitan population (see Table 4.5). As metropolitan population increases, MPOs are more likely to be either

independent entities or part of a regional organization. Conversely, as population decreases, MPOs are more likely to be hosted by county or city governments. These trends could influence the allocation of MPO resources to metropolitan freight planning as a city or county government might concentrate more on municipal transportation issues. An organization with decades of regional planning experience, on the other hand, might possess greater interest and capacity for broader-scale freight planning.

Table 4.5 MPO Organizational Structure (n=277)

Organizational structure	All MPOs	Small MPOs <sup>a</sup> (n=134)	Medium MPOs <sup>a</sup> (n=100)	Large MPOs <sup>a</sup> (n=43)
Independent organization				
Frequency per MPO category	65	23	28	14
Percent of MPO category total	23%	17%	28%	33%
Part of regional council / COG				
Frequency per MPO category	102	40	41	21
Percent of MPO category total	37%	30%	41%	49%
Part of county government				
Frequency per MPO category	36	20	14	2
Percent of MPO category total	13%	15%	14%	5%
Part of city government				
Frequency per MPO category	51	38	11	2
Percent of MPO category total	18%	28%	11%	5%
Part of state DOT				
Frequency per MPO category	4	1	2	1
Percent of MPO category total	1%	1%	2%	2%
Other				
Frequency per MPO category	19	12	4	3
Percent of MPO category total	7%	9%	4%	7%

<sup>a</sup> Categories based on 2010 MPO population. Small less than 200,000; Medium 200,000 to 1 million; Large greater than 1 million

Federal law requires the inclusion of wide-ranging transportation modes and activities in MPO planning. Yet, most MPOs fulfill their policy mandates with very small staffs. The median full-time staff of responding MPOs is four employees. Thirty percent of MPOs have two or fewer full-time staff for all of their MPO activities. And, in fact, six responding MPOs

carry out their metropolitan planning responsibilities without a single full-time employee. The full-time staffing figures match almost exactly the 4 median and 11.0 mean full-time figures found by GAO (2009), which was a national survey of MPOs with an 86 percent response rate. With relatively small staff sizes, many of these organizations have limited time and resources for freight planning. As one respondent noted, "With a staff of two, keeping our heads above water has been more pressing than freight."

Table 4.6 MPO Staffing: Overall Full-time Staff and Freight FTE Staff

Staff measure	All MPOs (n=278)	Small MPOs <sup>a</sup> (n=134)	Medium MPOs <sup>a</sup> (n=101)	Large MPOs <sup>a</sup> (n=43)
Average MPO full-time staff	11.2	3	8.5	43.6
Median MPO full-time staff	4	2	6	43
Average full-time equivalent (FTE) staff dedicated to freight planning	0.28	0.08	0.29	0.88
Median full-time equivalent (FTE) staff dedicated to freight planning	0	0	0	1

<sup>a</sup> Categories based on 2010 MPO population. Small less than 200,000; Medium 200,000 to 1 million; Large greater than 1 million

Generally small MPO staff size means that most MPOs have no freight planning personnel. Over two-thirds of responding MPOs have no full-time staff or full-time staff equivalents (FTE) dedicated to freight planning. As regional population increases, freight planning staff becomes more prevalent. Over half of MPOs with 2010 populations greater than 1 million employ at least one full-time freight planner (see Table 4.6).

Federal efforts to increase the freight planning capacity of MPOs have often focused on bolstering administrative capacity through courses and webinars. The National Highway Institute (NHI) offers online and in-person courses on freight planning. Just over 20 percent of MPOs reported having a staff member that completed an NHI freight planning class.

FHWA also hosts monthly "Talking Freight" webinars. These webinars were mentioned by

multiple respondents when asked about forms of training on freight transportation planning. Overall, however, freight planning training was relatively low at MPOs.

#### *4.3.b MPO Freight Planning and Other Stakeholders (Networking Capacity)*

One method for bolstering MPO freight planning capacity is utilizing relationships with freight stakeholders, industry groups, economic development groups, and governmental organizations to provide resources and expertise. Taylor and Schweitzer (2005), for example, showed that many MPOs utilize state DOTs for assistance with data collection, modeling, and other technical activities. Goldman and Deakin (2000) emphasize the importance of partnerships for MPOs to fulfill their policy mandates. The connection of MPOs to other freight planning stakeholders may be considered its networking capacity.

An MPO's communication about freight transportation with outside organizations offers the possibility of expanding an MPO's planning capacity, sharing resources, and collaborating on projects. Metropolitan transportation planning, as stipulated by the federal government, is an intergovernmental process between state DOTs and MPOs. This structured relationship is reflected by the finding that three-fourths of all MPOs communicate with their state DOT about freight transportation at least once per year. Many MPOs maintain even more regular contact with their state DOT with 30 percent communicating about freight on a monthly or even weekly basis.

The results regarding MPO communication with a regional business organization are important because these types of relationships are much less formalized than those between an MPO and state DOT. Frequency of communication, as expected, was less common with a regional business organization than with the state DOT. Yet, 20 percent of MPOs discuss freight transportation with a regional business organization at least once per month,

demonstrating that some MPOs maintain regular relationships with representatives of the private sector and business interest groups.

Relationships between MPOs and other organizations occur in formalized or institutionalized structures. The vast majority of MPOs maintain policy or governing boards that are the organization's primary decision-making bodies. The policy board often sets the strategic direction and influences the allocation of organizational resources. Nationally, some freight transportation interests have direct representation in MPOs with 27 percent of respondents having a freight transportation representative or stakeholder on their policy board.

In addition to policy and technical boards, the two predominant committees found at MPOs, many MPOs host or are members of other committees. These committees can be organized around a specific mode such as bicycle / pedestrian or a topic such as the transportation disadvantaged. The participation of an MPO in a regional freight transportation or logistics committee offers a formalized structure for the organizations to interact with other stakeholders. Regional freight committees in Philadelphia, Pennsylvania and Columbus, Ohio have received nationwide attention for their freight planning efforts. MPO participation a regional freight committee occurs at a similar frequency to freight representation on a policy board with 29 percent of MPOs belonging to a regional freight committee.

#### *4.3.c MPO Freight Data and Modeling (Technical Capacity)*

Transportation planning has traditionally been closely associated with technical activities including data collection, transportation modeling, and forecasting. Because most freight transportation activities are performed by for-profit companies freight transportation



data can be difficult to obtain. Even with these barriers, technical activities related to freight planning are fairly widespread in the 278 responding MPOs. Over fifty percent of responding MPOs collected data on heavy trucking between 2005 and 2012. There are indications that this data could be used more effectively as more than two-thirds of MPOs reported that freight had low or no incorporation in their regional travel demand model. The use of freight data and modeling in MPO planning is largely restricted to the highway modes of heavy trucks and commercial vehicles. Gaining a better understanding of freight trucking volumes as well as identifying major freight generators were commonly cited efforts when MPOs stated they wanted to bolster their freight planning. Despite the highway focus, over one hundred MPOs reported having collected freight rail data, which is somewhat surprising given the general perception about the difficulty of acquiring this type of data.

#### *4.3.d MPO Freight Planning and Studies (Plan-making Capacity)*

Although dedicated freight transportation planning staff is relatively rare at MPOs, almost all responding MPOs integrate freight to some extent in their transportation planning efforts. MPO freight planning seems most advanced in terms of long range transportation planning (see Table 4.7). For some MPOs, the process of updating their long range plan is the only time when planning resources are allocated to freight issues. Long range transportation plans represent one of the few planning outcomes required of all MPOs. The inclusion of freight into a long-range plan can take many forms from a cursory overview to widespread integration. The federal government mandates that MPOs address freight in their long-range plans but does not stipulate how this should be accomplished. Over half of all MPOs reported low or no incorporation of freight into this plan. Many freight sections

provide an overview of current freight conditions without articulating future-oriented strategies or goals.

Table 4.7 Freight Inclusion in Common MPO Planning Activities

Activity and extent of inclusion	Not at all	Low extent	Moderate extent	High extent
Regional travel demand model (n=261) <sup>a</sup>				
Frequency	52	119	71	19
Percent	20%	46%	27%	7%
Long range transportation plan (n=277)				
Frequency	14	140	99	25
Percent	5%	50%	36%	9%

<sup>a</sup> The sixteen MPOs indicating that they did not have a regional travel demand model are not included in these figures

In addition to or in conjunction with the LRTP, an MPO may also develop its own freight plan or conduct a freight study. These efforts require organizational resources in terms of staff time and budget and may also demonstrate organizational commitment to freight transportation issues. Freight plans are generally more comprehensive, looking at multiple modes, the region as a whole, and making recommendations for future actions. Freight plans are often incorporated into or emerge from an MPO's LRTP. Freight studies tend to be more specific and may focus on an issue, location, or mode. A freight corridor study is an example. As most MPOs have no freight planning staff, many freight plans and studies are performed by outside consultants. Just over one-quarter of responding MPOs had completed a stand-alone freight plan while more than half had participated in a freight study.

Although freight planning staffing levels are generally low, findings from the survey indicate that most MPOs believe freight to be a central component of their organization's work. Over 85 percent of respondents reported that freight was at least moderately important to their organization. These findings when combined with the high survey response rate

suggest that even though many MPOs have limited freight planning capabilities that this subject is still important to their organization.

#### **4.4 Aggregate Measures of MPO Freight Planning Capacity**

Capacity indicators were aggregated into an overall measure of freight planning capacity. The construct of MPO freight planning capacity is operationalized through the creation of an index comprised of thirteen capacity indicators corresponding to four capacity subtypes.

##### *4.4.a Relationships between Indicators of MPO Freight Planning Capacity*

The index of MPO freight planning capacity provides an overall measure of an MPO's ability to conduct freight planning. Analyzing the relationship between capacity indicators shows that they are spread widely rather than being concentrated in a group of MPOs. Many binary indicators of freight planning activity returned surprisingly similar frequencies of positive responses. Five of the eight binary indicators yielded positive results in the range of 22 to 29 percent. In addition to binary indicators, several other measures of freight planning activity occurred in about thirty percent of MPOs such as MPOs with freight staff, moderate to high incorporation of freight into a regional travel demand model, and MPOs that communicate with their state department of transportation least once per month. Despite the similar frequencies, correlations between the binary indicators are relatively low, indicating that there is a diffusion of MPO freight planning capacity.

MPO participation in a regional freight advisory committee or taskforce was one indicator most commonly associated with other binary measures. Compared with other pairs of freight planning indicators, an MPO being part of a freight advisory committee or taskforce was relatively highly correlated with both the development of a stand-alone

regional freight plan and the completion of a regional freight study. These findings suggest that the creation and function of institutionalized interorganizational structures warrant further examination in relationship to MPO freight planning.

#### 4.4.b Index of MPO Freight Planning Capacity

The aggregate measure of MPO freight planning capacity is a thirteen-item index, with each indicator grouped into a specific capacity sub-type. The thirteen indicators of MPO freight planning capacity, as discussed in Chapter 3, were standardized by transformation into z-scores and then combined to create an overall index of MPO freight planning capacity. Sub-indices of MPO freight planning capacity were also developed by combining indicators for each capacity type.

Table 4.8 MPO Freight Planning Capacity Index by Indicator and Capacity Sub-type

Indicator by Capacity Sub-type	Variable Type	n	Mean	Standard Deviation	Min	Max
<i>Administrative Capacity</i>						
Freight staff	Continuous	278	0.28	0.55	0	5
NHI freight training	Dichotomous	277	0.22	0.42	0	1
Freight importance to MPO	Ordinal	278	2.34	0.90	0	4
<i>Networking Capacity</i>						
Freight on policy board	Dichotomous	278	0.27	0.44	0	1
MPO on freight taskforce	Dichotomous	278	0.29	0.45	0	1
Freight communication with state DOT	Ordinal	276	2.09	0.80	0	4
Freight communication with business organizations	Ordinal	278	1.59	1.02	0	4
<i>Technical Capacity</i>						
Collect heavy truck data	Dichotomous	277	0.59	0.49	0	1
Collect freight rail data	Dichotomous	277	0.36	0.48	0	1
Freight in travel demand model	Ordinal	277	1.15	0.87	0	3
<i>Plan-making Capacity</i>						
Freight in LRTP	Ordinal	278	1.49	0.73	0	3
MPO freight plan	Dichotomous	277	0.28	0.45	0	1
MPO conducted freight study	Dichotomous	278	0.53	0.50	0	1

The transformation of indicator observations into z-scores and their subsequent summation means that the index provides a relative rather than absolute measure of an MPO's level of freight planning capacity. An index score of 0 should be interpreted as the organization having a mean level of freight planning capacity. A mean level of freight planning capacity, as discussed in the previous sections of this chapter, is still somewhat low. An index score of 1 signifies that the organization is, on average, one standard deviation above the mean MPO for each indicator of freight planning capacity. High and low index capacity scores signify that the MPO consistently far away from the average MPO across multiple capacity indicators.

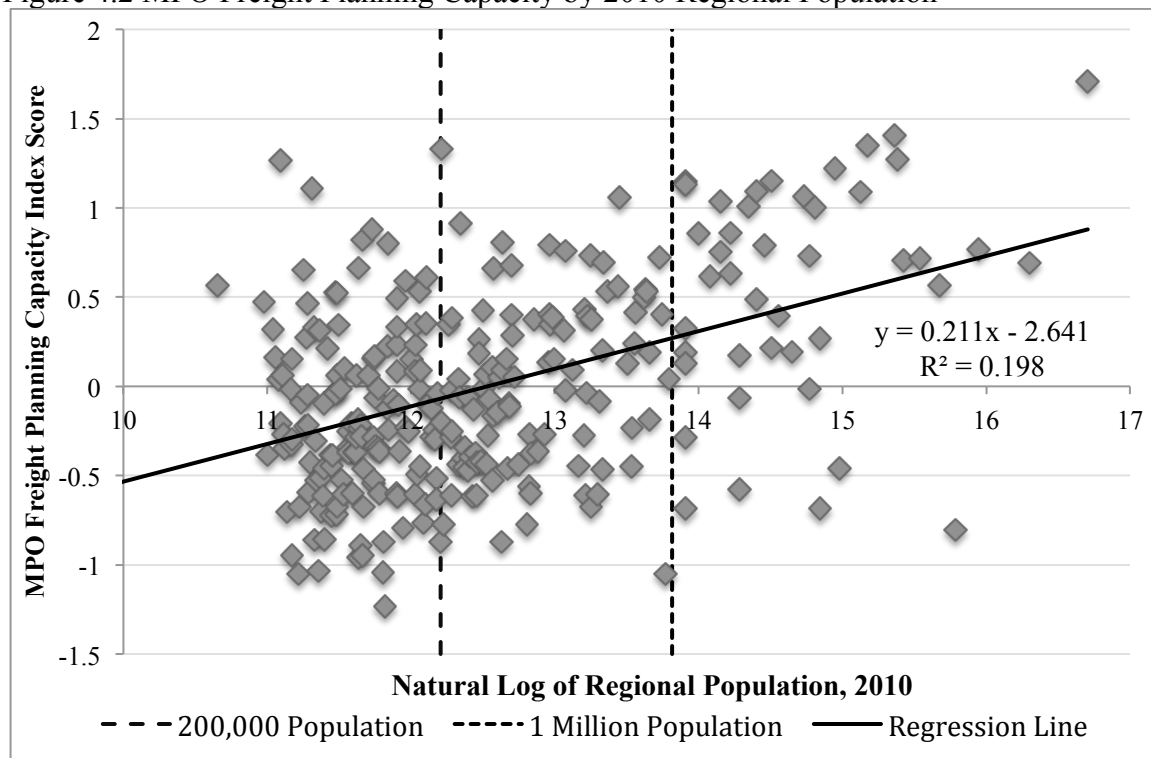
The index of freight planning capacity was constructed by standardizing and then summing the thirteen indicators and then dividing that sum by the total number of indicators. Because networking capacity has four indicators instead of three that means networking has a relatively higher weight in the overall index score than the other three capacity subtypes.

#### *4.4.c Freight Planning Capacity and Regional Population*

The index will be used extensively in Chapter 5 to assess predictors for MPO freight planning capacity, but one trend immediately becomes apparent. There is a positive correlation between regional population and MPO freight planning capacity. This relationship is expected as population tends to be correlated with the intensity of transportation activities. Transforming regional population by taking its natural log shows an overall exponential relationship between population and capacity (see Figure 4.2). It should be noted that there is still variation despite controlling for population. Some MPOs in small regions have very high levels of freight planning capacity.

There are distinct overall trends when dividing the responding MPOs into three groups by population size. MPOs in regions under 200,000, as expected, have below average levels of freight planning capacity. The highest levels of freight planning capacity are generally found in the most populous regions. The middle group, with populations between 200,000 and one million, is particularly interesting. The mean capacity score for medium-sized MPOs is right around zero. MPOs in these medium-sized regions may be in transition points where organizations begin specializing in more specific types of transportation planning such as goods movement. A more in-depth assessment, such as what will occur in Chapter 6, may allow for a better understanding of how MPOs navigate this transition or when MPOs begin to have greater levels of resources why some decide to focus more on freight.

Figure 4.2 MPO Freight Planning Capacity by 2010 Regional Population



Looking at the sub-types of capacity by population is also interesting because it allows for a more detailed understanding of how freight planning capacity tends to increase with regional population (see Table 4.9). When comparing MPOs in the Small and Medium regions the greatest difference in mean capacity is for administrative and plan-making capacity. These differences suggest that the medium-sized MPOs have greater levels of resources that may be allocated towards freight planning staffing, training, studies, and planning. Technical capacity changes the least suggesting a fairly even distribution of technical freight planning capabilities across both groups. Networking capacity, on average, does not increase dramatically until an MPO represents a very large metropolitan region. Administrative and plan-making capacity may be the areas where medium-sized MPOs have the greatest ability and opportunity to bolster their organization's freight planning.

Table 4.9 Mean Capacity Score by MPO Size and Freight Planning Capacity Type

MPO Size	n	Administrative Capacity	Networking Capacity	Technical Capacity	Plan-making Capacity	Overall Capacity
Small	134	-0.22 (0.59)	-0.16 (0.63)	-0.09 (0.74)	-0.24 (0.66)	-0.18 (0.48)
Medium	101	0.00 (0.59)	-0.05 (0.62)	-0.05 (0.69)	0.09 (0.72)	0.00 (0.48)
Large	43	0.67 (0.84)	0.61 (0.72)	0.41 (0.71)	0.54 (0.82)	0.56 (0.62)

\* note: standard deviations in parentheses

#### 4.5 Trends in MPO Freight Planning

In 2003, the Association of Metropolitan Planning Organizations (AMPO) conducted, to my knowledge, the first nationwide survey of MPOs specifically focused on freight planning. While differences in response rates, respondents, and questions impede exact comparisons between that survey's results and the one conducted for this study nine years later, when analyzed together the surveys show some but not great progress in MPO freight

planning. For both the 2003 and 2012 surveys, almost the exact same percentage of respondents (just over 20 percent) had one or more staff member dedicated to freight planning. While staffing specialization appears to have remained at the same level, the percentage of MPOs with freight committees jumped from 18 percent in 2003 to 29 percent in 2012, perhaps reflecting a more widespread institutionalization of freight planning into MPO activities. Assuming that MPOs who do freight planning are more likely to respond to a survey about freight planning, the more than doubling of respondents from 136 to 278 while maintaining or increasing the proportional figures of freight planning suggests that aggregate freight planning at MPOs might have increased more than the proportional figures suggest.

#### **4.6 Conclusion**

Findings from the national freight planning survey confirm previous studies that the majority of MPOs have relatively limited freight planning capabilities. MPO freight planning capacity generally increases with regional population, and the greatest average capacity increases between small and large MPOs are in indicators of administrative capacity. The mean levels for technical capacity were more similar across the different groupings of MPOs by population size. While the overall levels of MPO freight planning capacity were relatively low, the widespread participation in the survey as well as responses to individual questions suggest that MPOs generally want to expand their capabilities and efforts in freight planning.

The results underscore the scant resources that many MPOs possess for fulfilling their federal policy mandates. The difficulties of conducting metropolitan planning with limited means extend far beyond freight modes and affect many aspects of MPO planning. Every MPO must produce a long-range transportation plan, a transportation improvement program (TIP), a unified planning work program (UPWP), and a public participation plan (PPP). With



a median staff size of four full-time employees, many MPOs can expend all of their organizational resources fulfilling these core responsibilities. The stated federal policy ambition of integrated multimodal regional planning for goods and people simply is not realistic for many MPOs given the available resources.

Freight issues tend to be localized, vary between regions, and encompass a wide range of challenges. The primary freight issues facing metropolitan regions consist of infrastructure maintenance and highway congestion. Expanding economic development opportunities and improving freight mobility spur most MPOs to conduct freight planning. The minimization of adverse impacts tends to be a much lower priority. The widespread prioritization of job creation to alleviate relatively high unemployment levels during the period of survey administration could help explain these findings.

Despite the overall challenges, most MPOs incorporate freight to some extent into their planning processes. The highway modes of heavy trucks and commercial vehicles are most frequently integrated into regional travel demand models and long range transportation plans. MPOs also most commonly collect data about these freight highway modes. The participation of a majority of MPOs in a regional freight study as well as the stated importance of freight to organizational work suggests recognition of the role of MPOs in metropolitan freight planning.

Findings from the survey show elevated freight planning capability as the regional population increases. While this conclusion makes logical sense, exceptions to this overall pattern remain unexplained. Some MPOs with small regional populations possess many indicators of high freight planning capacity while some very large MPOs rarely conduct freight planning. The following chapter analyzes the determinants and predictors of MPO

freight planning capacity with an emphasis on the policy of MPO categorization by population size, MPO organizational structure, and other regional and state-level factors that could influence freight planning capacity.

In their study of MPO administrative capacity, Bond, Kramer, and Seggerman (2010) found that staffing specialization tends to occur when an MPO reaches a full-time staff of eight employees. With staffing levels below this figure, the wide-ranging MPO responsibilities would make it difficult for staff specialization on a particular issue or mode. The authors also found that when MPOs began having specialized staff, freight is one of the last areas for specialization to occur. These findings are supported by the results from this study showing that a freight planner only becomes a staff specialty when MPO staffs become relatively large and MPO staffs only reach these levels in the largest metropolitan regions. For freight planning to become much more common across the spectrum of MPOs, these findings suggest that overall MPO staffing levels would have to increase substantially.

Although freight sources are major contributors to greenhouse gas (GHG) emissions in the United States, and many regions face potential threats related to storm severity and sea level rise, mentions of global climate change were noticeably absent from survey respondents. Freight contributes 28.8 percent of US transportation GHG (US DOT 2013, 75), and freight GHG emissions are rising much faster than passenger GHG emissions. From 1990 to 2011, freight GHG emissions increased by 50.4 percent whereas passenger GHG emissions grew by 10.9 percent (US DOT 2013, 75). Although not asked specifically about climate change, respondents had opportunities to specify additional metropolitan freight issues, motivations for conducting freight planning, as well as to provide comments at the conclusion of the survey. In all 278 responses, there was not a single mention of GHG, global

warming, or climate change. The survey responses showing that air quality and environmental justice are not commonly cited as motivations for MPO freight planning supports the conclusion that environmental and social concerns are peripheral relative to economic development and freight mobility.

## **5 Determinants and Predictors of MPO Freight Planning Capacity**

Findings from the national survey of MPOs presented in the previous chapter show wide variation in MPO freight planning capacities, experiences, and motivations. This chapter builds on that analysis by examining determinants and predictors of MPO freight planning capacity. Relationships from the conceptual framework presented in Chapter 2 are modeled and tested here through statistical analyses.

This chapter examines two overarching components and how they influence MPO freight planning: a) federal policy, and b) relationships between MPOs and other stakeholders. The primary federal policy assessed is the designation of MPOs with populations over 200,000 as TMAs that provides the organizations higher levels of authority and responsibility relative to their smaller MPO peers. To examine these research questions this study employs regression discontinuity because this quantitative method allows for the explicit modeling of the federal policy process of MPO designation as to whether or not a region must be represented by an MPO and if the MPO should also be a TMA. Regression discontinuity is a quasi-experimental design that is particularly strong for internal validity (Shadish, Campbell, and Cook 2002). This chapter utilizes RD to test the causal link between TMA designation and MPO freight planning capacity.

To examine MPO relationships with other stakeholders, this chapter focuses on regional freight champions and the potential influence of the presence or absence of a regional freight champion on MPO freight planning capacity. This study employs the statistical method of multiple regression to examine this set of research questions. Multiple

regression with cross-sectional data tests associations between variables in contrast to causal mechanisms, but multiple regression allows for a broader examination of predictors of MPO freight planning capacity by being less stringent in its modeling requirements.

Consistent with the dual focus, this chapter begins with an examination of the effects of federal policy on MPO freight planning by using regression discontinuity to analyze if TMA designation is a determinant of MPO freight planning capacity. The chapter then moves to examining other potential predictors of MPO freight planning capacity with a focus on the relationships between MPOs and freight stakeholder organizations. Specifically, the statistical method of multiple regression examines the association between the identification of a regional freight champion and MPO freight planning capacity. The chapter concludes with a discussion of the findings about the determinants and predictors of MPO freight planning capacity and also how the results from quantitative analyses of Chapters 4 and 5 inform the qualitative case studies of regional freight planning presented in the next chapter.

### **5.1 Examining the Effects of TMA Designation Using Regression Discontinuity**

The purpose of employing a regression discontinuity design and analysis is to examine research questions about the effects of the federal policy on MPO freight planning. Specifically, the RD analyses test the hypothesis that TMA designation leads to higher levels of MPO freight planning capacity. The initial designation of MPOs and assignment to TMA status is based on a strict regional population cutoff of 200,000. In the following regression discontinuity models, a positive discontinuity at the cutoff would suggest a causal link between TMA designation and increased levels of MPO freight planning capacity. A standard regression discontinuity model, such as presented by Shadish, Campbell, and Cook (2002), includes only assignment and treatment variables, and results from this type of models

will be presented first. The RD model will then be expanded to include covariates to control for contextual and geographical differences between MPOs. In both the standard and expanded RD analyses, additional models will be presented that restrict MPOs based on population bands around the cutoff. Restricting units to bands based on values of the assignment variable may be used in RD models to help improve the modeling of functional form, specifically near the cutoff (Imbens and Lemieux 2008). In addition, sub-indices of MPO freight planning capacity are examined to assess whether the potential effects of TMA designation vary depending on capacity type: administrative, networking, technical, and plan-making.

#### *5.1.a Standard RD Models with Treatment and Assignment Variables*

Table 5.1 presents the results of four standard RD models: one with the full set of MPOs in the RD analysis and three with subsets of this population based on population bands around the cutoff. Results from the full set of MPOs show a reasonable overall model fit with an adjusted R-squared of 0.20. However, when the MPOs with the largest regional populations are excluded, the RD models decrease dramatically in their accounting for variations in MPO freight planning capacity. For example, excluding MPOs with urbanized areas over one million reduces the adjusted R-squared from 0.20 to 0.04. The standard RD model is a particularly poor fit for MPOs below the cutoff, that is MPOs with 2000 Census urbanized areas under 200,000 people. When calculated separately, the adjusted R-squared for MPOs below the cutoff is 0.004, while the adjusted R-squared for MPOs above the population cutoff of 200,000 is 0.20. This difference suggests that the assignment variable (urbanized area population in 2000) and its square are much better at predicting freight planning capacity for larger MPOs than for smaller MPOs. One additional difficulty posed by

the assignment variable is that the population range for non-TMA MPOs is much smaller than TMA MPOs. Non-TMAs have a potential population range between 50,000 and 199,999, while TMAs have a potential range from 200,000 to infinity. In actuality, the largest TMA has a regional population of 17.8 million.

Table 5.1 Results from Standard RD Analyses for All MPOs and Subsets of MPOs

	All MPOs		Less than one million	Between 50,000 and 350,00		Between 100,000 and 300,000
TMA Designation	0.140 *		-0.073	-0.312 *		-0.255
	(0.077)		(0.142)	(0.163)		(0.201)
Population	0.260 ***		1.011	2.735 ***		2.01
	(0.059)		(0.621)	(0.959)		(1.785)
Population squared	-0.013 ***		-0.861	8.614		12.392
	(0.003)		(1.029)	(5.552)		(17.639)
Constant	-0.120 ***		-0.032	0.027		-0.006
	(0.037)		(0.082)	(0.087)		(0.120)
n	261		229	196		89
above cutoff	99		67	34		26
below cutoff	162		162	162		63
R-squared	0.21		0.05	0.04		0.02
Adj. r-squared	0.20		0.04	0.02		-0.01

Notes: Robust standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$   
Population is the MPO's UZA population from 2000. Figures for population are presented in millions and population squared in trillions.

In this analysis the most important variable and statistical result relates to the treatment variable, which is TMA designation. As described in Chapter 3, in these RD models the value for the assignment variable is subtracted by the value for the cutoff, which is 200,000. The coefficients for TMA designation in Table 5.1 therefore estimate the effect of TMA designation on MPO freight planning capacity. In the RD model with all MPOs the coefficient is positive and statistically significant at the level of  $p < 0.1$ , which supports the original hypothesis. If this initial result held, it would suggest that TMA designation leads to

an increase in MPO freight planning capacity index score by 0.14 or 14 percent from the mean value reported in Chapter 4.

However, when the RD model is restricted to a subset of MPOs with populations under one million or when it models population bands of 150,000 and 100,000 around the cutoff, the coefficient's sign becomes negative and the statistical significance disappears. In fact, the TMA designation coefficient for the population band of 150,000 is negative and statistically significant at the  $p < 0.1$  level, a result that is unexpected. The positive and statistically significant finding for TMA designation in the model with all MPOs is likely caused by influential units far away from the cutoff, in this case MPOs with urbanized area populations in the millions. The standard RD analysis as presented in Table 5.1 shows a null finding in terms of the effect of TMA designation on MPO freight planning capacity.

The null finding for TMA designation in the preceding regression discontinuity models is corroborated through a visual analysis of the data. Visual analysis is often an important component of RD methods because a researcher can visually detect whether or not there is a discontinuity at a specified cutoff as well as to gain information in modeling functional form to bolster statistical conclusion validity (Trochim 1984, 1990). Figures 5.1 and 5.2 depict the regression results of the four RD models presented in Table 5.1. In Figure 5.1 the solid lines represent the RD model with all MPOs and dashed lines represent the standard RD model when it is restricted to MPOs with regional populations of less than one million. The positive discontinuity for all MPOs and the negative discontinuity for MPOs with populations under one million that were presented as TMA regression coefficients in Table 5.1 can clearly be seen graphically in Figure 5.1, which is also graphically truncated to only show MPOs with populations under one million. Visually, there seems to be no



discontinuity between the left and right sides of the cutoff. The absence of a discontinuity is supported by visual analysis of the RD models when MPOs are restricted to bands of 150,000 and 100,000 from the cutoff. While MPO freight planning capacity is generally increasing with population there is no jump in capacity or change in the intercept at the cutoff. The visual discontinuity, so often a hallmark of RD designs with statistically significant findings, is not present in these models

Figure 5.1 RD Models with Full Population and Less than to One Million Population

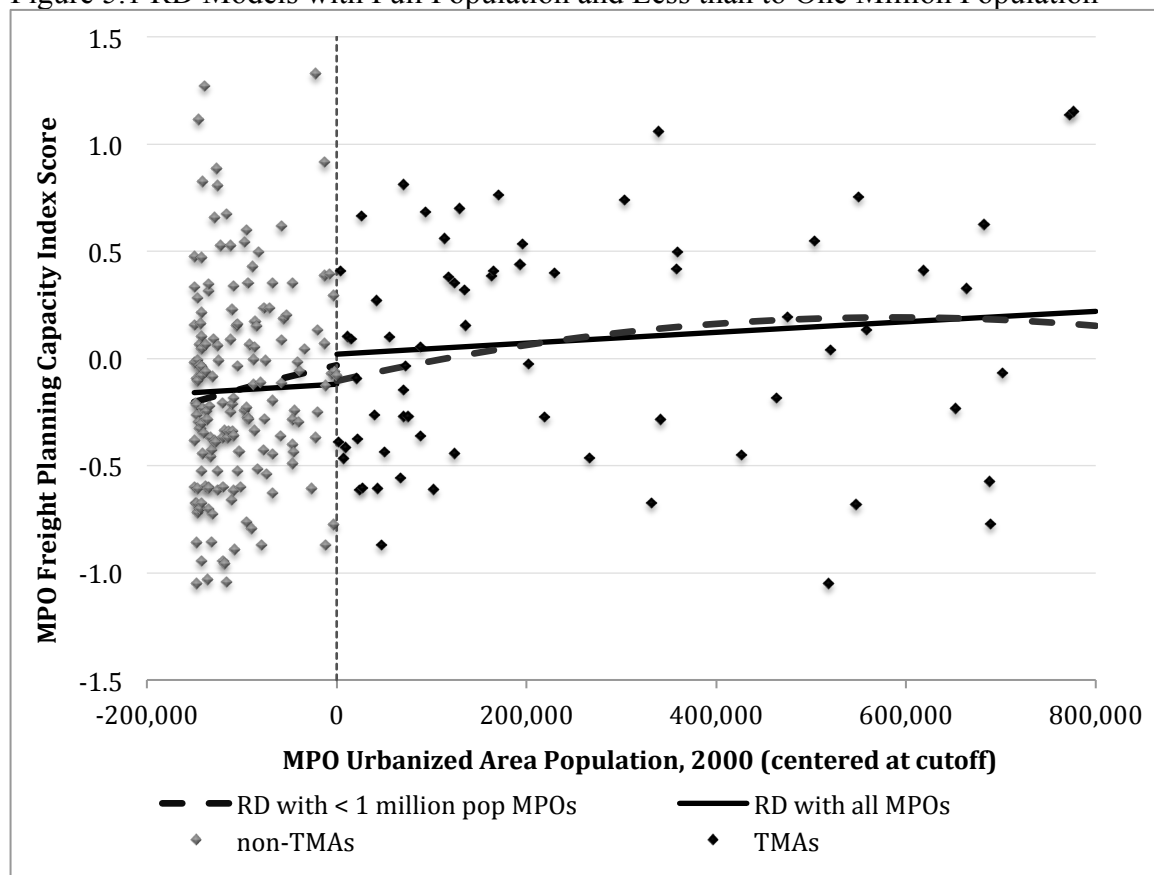
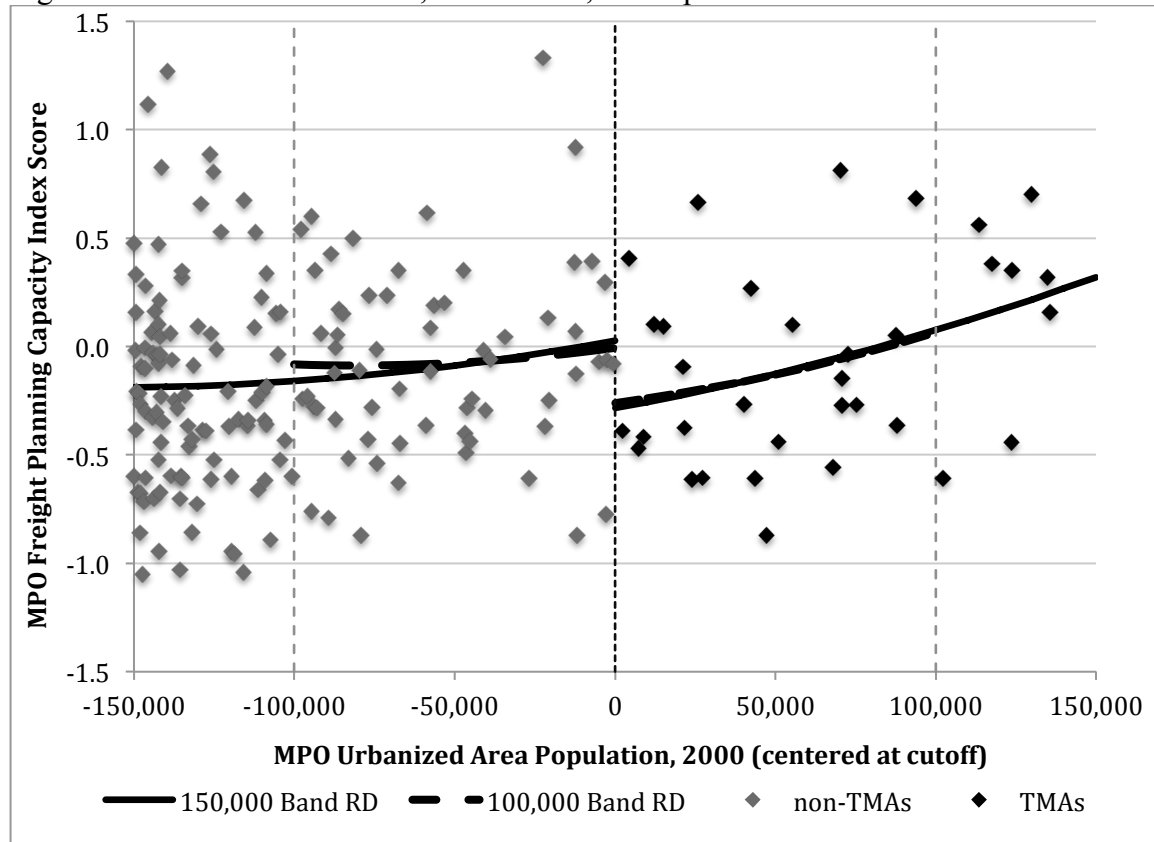


Figure 5.2 RD Models with 150,000 and 100,000 Population Bands



Although the RD analysis yielded a null finding in terms of the effect of TMA designation on overall MPO freight planning capacity, assignment to treatment could still be important for specific sub-types of freight planning capacity. The RD models were examined in greater detail by using sub-indices of metropolitan freight planning capacity as the outcome variable in the RD models. The four sub-indices consist of freight planning capacity in terms of administrative capacity, networking capacity, technical capacity, and plan-making capacity. The results of these analyses using the full set of MPOs without missing data are presented in Table 5.2 and show a positive coefficient for administrative, networking, and plan-making capacity with the latter two results significant at the  $p < 0.1$  level. These results suggest that the sign and significance for the overall measure of freight planning capacity from Table 5.1 can be mostly attributed to the freight planning components of networking

and plan-making capacity. The sub-index of technical capacity seems to contribute the least to explaining variations in MPO freight planning capacity. As with the results from the RD analysis of overall capacity, any statistical significance of TMA designation vanished for the sub-indices when the largest MPOs were excluded from the models. MPOs with populations at great distances from the cutoff once again had great influence on the regression results in the full models.

Table 5.2 Standard RD Models of Sub-indices of MPO Freight Planning Capacity

	Admin Capacity		Networking Capacity		Technical Capacity		Plan- making Capacity	
TMA Designation	0.163 (0.102)		0.171 (0.101)	*	0.001 (0.106)		0.216 (0.111)	*
Population	0.355 *** (0.082)		0.241 *** (0.079)		0.216 *** (0.058)		0.226 *** (0.075)	
Population squared	-0.018 *** (0.005)		-0.013 *** (0.005)		-0.011 *** (0.003)		-0.008 * (0.005)	
Constant	-0.153 *** (0.046)		-0.122 ** (0.049)		-0.053 (0.057)		-0.146 *** (0.054)	
N	261		261		260		261	
R-squared	0.23		0.13		0.06		0.14	
Adj R-squared	0.22		0.12		0.05		0.13	

Notes: Robust standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Population is the MPO's UZA population from 2000. Figures for population are presented in millions and population squared in trillions.

### 5.1.b Expanded RD with Covariates

Regression discontinuity designs are often implemented in research projects, such as the evaluation of educational programs, where the context or setting varies little between units. When considering Cronbach's conceptions of units, treatments, variables, and settings (UTOS), the units (Cronbach and Shapiro 1982), which are MPOs in this study, may receive the same treatment and be measured in the same way while having quite different settings

such as being located in West Texas in contrast to a suburban region in the northeast.

Covariates are introduced into the RD model to help control for potential variations in the settings and context of MPOs (Imbens and Lemieux 2008). Six covariates identified and presented in Chapter 4 were added to the standard RD models with treatment and assignment variables. The results for four expanded RD models with covariates are presented in Table 5.3.

The introduction of covariates into the RD models improves overall model fit, particularly for the subsets of MPOs with smaller regional populations, although some of the improvement likely stems from fewer degrees of freedom. A comparison of the adjusted R-square values between the models in Table 5.1 and 5.3 shows that even when accounting for the reduced degrees of freedom, the addition of the covariates improves overall fit for all of the models except for the most restrictive population band.

The expanded RD models with covariates show no effect of TMA designation on MPO freight planning capacity. The coefficient for the model with all MPOs is still positive, but the size of the coefficient is greatly reduced and not statistically significant. For the subsets of MPOs with smaller regional populations, the coefficient for TMA becomes negative and is actually statistically significant at the  $p < 0.1$  level for the 150,000 population band around the cutoff. The results from these RD models add further evidence to conclude a failure to reject the null hypothesis or a null finding.

Table 5.3 Results from RD Models with Covariates for Selected Population Subsets

	All MPOs		Less than one million		Between 50,000 and 350,000		Between 100,000 and 300,000
TMA	0.039 (0.084)		-0.045 (0.140)		-0.311 (0.160)	*	-0.285 (0.191)
Population	0.201 (0.062)	***	0.320 (0.645)		2.312 (0.954)	**	2.160 (1.783)
Population squared	-0.010 (0.004)	***	-0.032 (1.009)		10.765 (5.472)	*	8.141 (17.940)
Pop within 500 miles	0.433 (0.329)		0.263 (0.348)		-0.076 (0.358)		0.198 (0.545)
Area (sq. mile)	0.021 (0.009)	**	0.035 (0.026)		0.027 (0.037)		0.010 (0.066)
Interstate	0.138 (0.095)		0.133 (0.097)		0.140 (0.098)		0.163 (0.183)
Intermodal connector	0.190 (0.069)	***	0.172 (0.072)	**	0.29 (0.073)	*	-0.026 (0.100)
Class 1 railroad	0.171 (0.092)	*	0.195 (0.093)	**	0.157 (0.093)	*	0.108 (0.158)
NAAQs non- attainment	-0.033 (0.075)		-0.001 (0.076)		0.005 (0.078)		-0.091 (0.125)
Constant	-0.561 (0.124)	***	-0.533 (0.170)	***	-0.334 (0.171)	*	-0.222 (0.286)
N	261		229		196		89
R-squared	0.27		0.11		0.08		0.06
Adj R- squared	0.24		0.08		0.04		-0.05

Notes: Robust standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Population is the MPO's UZA population from 2000. Figures for population are presented in millions, population squared in trillions, and area in thousands.

Population within 500 miles is percentage of total US population.

While the expanded RD models yield a null finding in terms of the effects of TMA designation on MPO freight planning capacity, the model results for the covariates provide interesting insights into alternative explanations for variations in MPO freight planning capacity. Regional population is positively associated with capacity, but the strength of the

association decreases when the model expands to include other explanatory variables. Two binary variables, presence of an intermodal connector and presence of a Class 1 railroad, remain positive and statistically significant in at least the  $P < 0.1$  level in all four models presented in Table 5.3. The possibility that an MPO located a region with a federally-designated intermodal connector or Class 1 railroad could dedicate more resources to freight planning is plausible and will be explored in greater detail in subsequent multiple regression models of MPO freight planning capacity. Interestingly, air quality non-attainment status, which is a central component of federal transportation policy and has the potential to influence funding for transportation projects, in all four models has almost no association with an MPO's capacity to conduct freight planning. It is also important to note that the percentage of US population within a 500-mile radius, a metric of geographic centrality commonly touted evidence to support freight transportation hub or inland port, is not statistically significant in any of the four models in Table 5.3.

## **5.2 Examining Other Predictors of MPO Freight Planning Capacity**

We know that while MPOs overall have relatively low levels of freight planning capacity that there are still considerable variations between organizations. The preceding regression discontinuity models show that the federal policies of TMA designation and a region's air quality attainment status have no effect on MPO freight planning capacity. If two of the major components of federal policy for metropolitan transportation planning have no effect on their ability to conduct freight planning then what are the factors that lead to higher, lower, or average levels of freight planning capacity? The multiple regression models in this section use the full study population and additional explanatory variables to examine alternative explanations in greater detail. These variables were not included in the RD models

for parsimony and to avoid potential endogeneity between the independent variables and the outcomes, although endogeneity remains a concern for the multiple regression models.

#### *5.2.a Multiple Regression Models of MPO Freight Planning Capacity*

The first multiple regression model to examine metropolitan freight planning capacity begins with the expanded RD model with covariates from Table 5.3 and then updates the model in three specific ways because the models do not have to maintain the more strict requirements of modeling the process of assigning MPOs to TMA status. The multiple regression models add the seventeen MPOs that were excluded from the RD models in an effort to better model the assignment to treatment for a total study population of 278. Instead of using the 2000 population for the urbanized area associated with the MPO, the multiple regression models use the 2010 population of the actual region defined by organizational boundaries. And, lastly, since the index of freight planning capacity is comprised of standardized z-scores, new MPO freight planning capacity index scores were calculated based on the set of 278 MPOs.

A major change between the RD models and the multiple regression models is the introduction of explanatory variables derived from the MPO freight planning survey. These variables consist of the number of full-time staff with any freight staff subtracted from that figure to reduce issues of endogeneity as well as the identification a regional freight champion by an MPO. While the RD analyses focused on explanatory factors exogenous to MPOs (what can be termed “external variables”), the inclusion of “internal variables” derived from the survey help examine additional research questions and especially those related to the influence of other organizations on MPO freight planning capacity. The

potential for bias caused by having explanatory and outcome variables derived from the same source should be noted and will be discussed in section 5.3.

Table 5.4 presents multiple regression models of predictors of MPO freight planning capacity with three sets of explanatory variables: one solely derived from sources external to the national survey, one with only variables internal to the survey, and a combined model. Results from the multiple regression model with external variables actually has a worse overall model fit than its RD counterpart. The higher r-squared for the RD model may be the result of model specification focusing on TMA designation. The population variables lost some statistical significance moving from the RD model to the multiple regression model. The geographic size of an MPO increased in significance in the multiple regression model, and this variable may be of particular importance as it is often argued that freight planning is much better suited to large geographic areas.

The results of the multiple regression model shown in Table 5.4 comprised of only the two explanatory variables from the survey, the number of MPO full-time staff and the identification of a regional freight champion, are striking. This model produces a better overall fit than any previous model presented in this chapter, even the expanded RD model with covariates. The coefficients for both explanatory variables internal to the survey are positive and highly statistically significant.

The final multiple regression model presented in Table 5.4 combines the explanatory variables from the previous two models. With an adjusted R-squared of 0.33, the combined model explains more variation of MPO freight planning capacity than any of the previous models. Even with this relatively high R-squared, almost two-thirds of the variation in MPO freight planning capacity remain unexplained. All of the variables in the first two models in



Table 5.4, other than regional population, that were statistically significant at the  $p < 0.05$  level retain their statistical significance in the combined model. The magnitude of each coefficient declines in the combined model with the coefficient for MPO full-time staff decreasing by over 50 percent. In contrast, the coefficient for the regional freight champion variable changes only slightly with a relative decline of -2.7 percent. The changes in the statistical significance of the population variables suggest that these are proxy variables for other measures that better explain variations in MPO freight planning capacity. The bivariate correlation between MPO full-time staff and regional population in 2010 yields a figure of 0.72 even though these measures having been derived from completely independent sources, and this correlation helps explain why population loses its statistical significance in the combined model.

Table 5.4 External, Internal, and Combined Multiple Regression Models

	External variables	Internal variables	Combined model
TMA designation	0.053 (0.083)	-	0.072 (0.078)
Population 2010	0.153 ** (0.061)	-	0.034 (0.079)
Population squared, 2010	-0.009 ** (0.004)	-	-0.002 (0.005)
Population within 500 miles	0.349 (0.328)	-	0.514 * (0.304)
Area (square miles)	0.041 *** (0.014)	-	0.037 ** (0.015)
Interstate	0.138 (0.093)	-	0.121 (0.085)
Intermodal connector	0.191 *** (0.068)	-	0.147 ** (0.062)
Class 1 railroad	0.162 * (0.089)	-	0.126 (0.084)
NAAQs non-attainment	-0.036 (0.075)	-	0.001 (0.073)
MPO full-time staff (non-freight)	-	0.009 *** (0.001)	0.004 * (0.002)
Regional freight champion	-	0.405 *** (0.062)	0.394 *** (0.067)
Constant	-0.588 *** (0.120)	-0.231 *** (0.037)	-0.681 *** (0.115)
N	278	278	278
R-squared	0.25	0.28	0.36
Adjusted R-squared	0.22	0.27	0.33

Notes: Robust standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$   
Population is the number of people living within an MPO's boundaries in 2010.

One potential hazard of focusing on regression discontinuity in terms of research design and statistical methods is the tendency to retain a focus on the key variables from the RD design even when specifying models to examine different research questions than those focusing on the effects of federal policy. In regression discontinuity, the treatment and

assignment variables, TMA designation and a population measure in this case, are the most important variables. In fact, those variables must be included in all RD models. However, in this analysis of potential predictors of metropolitan freight planning capacity, the change in statistical methods from regression discontinuity to multiple regression removes the requirement of including the treatment and assignment variables. The results of the combined model in Table 5.4 where none of the population variables are statistically significant suggest that population may be a proxy for other variables such as the number of full-time staff at an MPO and that other variables are more directly linked with the outcome variable than regional population.

Removing population, the square of population, and TMA designation from the multiple regression models changes remarkably little in the results while making the model more parsimonious. Table 5.5 replicates the multiple regression models in Table 5.3 with those three variables removed. The models with only explanatory variables from the survey, of course, remain exactly the same. While the adjusted R-squared for the external variable model declines, as expected, from 0.22 to 0.19, the adjusted R-squared for the combined model actually remains the same at 0.33. The removal of the population variables yields a more parsimonious model without decreasing its ability to account for variations in MPO freight planning capacity.

Table 5.5 Multiple Regression Models without TMA Designation and Population

	External variables		Internal variables		Combined models
Population within 500 miles (pct.)	0.212 (0.334)		-		0.489 (0.302)
Area (square miles)	0.051 *** (0.010)		-		0.034 *** (0.006)
Interstate	0.186 ** (0.090)		-		0.147 * (0.083)
Intermodal connector	0.278 *** (0.061)		-		0.179 *** (0.057)
Class 1 railroad	0.209 ** (0.089)		-		0.137 * (0.080)
NAAQS non-attainment	0.059 (0.074)		-		0.023 (0.069)
MPO full-time staff (non-freight)	-		0.009 *** (0.001)		0.005 *** (0.001)
Regional freight champion	-		0.405 *** (0.062)		0.397 *** (0.066)
Constant	-0.636 *** (0.119)		-0.231 *** (0.037)		-0.700 *** (0.109)
N	278		278		278
R-squared	0.21		0.28		0.35
Adjusted R-squared	0.19		0.27		0.33

Notes: Robust standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The removal of the TMA designation and regional population variables also yields interesting results in terms of individual explanatory variables. All model variables other than the percentage of US population within 500 miles of the MPO and a region's NAAQS attainment status are positive and at least statistically significant at the  $p < 0.1$  level. An MPO's geographic area as well as the presence of a federally-designated intermodal connector are both explanatory variables derived from sources external to the survey with highly significant positive coefficients. As in almost all of the multiple regression models,

both MPO full-time staff and the identification of a regional freight champion have positive statistically significant regression coefficients.

#### *5.2.b Multiple Regression Models for Subsets of Full Study Population*

One notable result from the RD models was that the overall model fit declined dramatically as subsets of MPOs were restricted by increasingly narrow bands of regional population. The statistical significance of the regression results also decreased substantially or disappeared entirely. None of the variables from the RD model in Table 5.3 when MPOs were restricted to a population band of 100,000 on either side of the cutoff were statistically significant.

The combined multiple regression models that exclude the TMA designation and regional population variables, even when restricted to smaller subsets of MPOs based on regional population, return relatively stable results. As shown in Table 5.6, the overall model fit in terms of adjusted R-squared drops from 0.33 to 0.19 when moving from all MPOs to only MPOs with regional populations under one million. However, unlike the models that use regional population and not the variables of full-time staff and identification of a regional freight champion, the adjusted R-squared for the model never falls below 0.15. In contrast to the models in Table 5.3, the combined models in Table 5.6 have much better fit for MPOs with smaller regional populations.

In terms of predictors of MPO freight planning capacity derived from sources external to the survey, when the subset of MPOs was restricted to organizations with regional populations under one million, the regression coefficients for geographic area and presence of an intermodal connector become statistically insignificant. However, the results for the Class 1 railroad binary variable change only slightly. In the model with the smallest regional

population subset, the Class 1 railroad becomes statistically insignificant but the actual regression coefficient appears similar to the results from the other models.

The relatively high adjusted R-squared value for the models in Table 5.6 demonstrates the strong association between the explanatory variables derived from the survey and the outcome variable. To what extent these associations are indications of endogeneity and mono-method bias or to what extent these associations suggest theoretically interesting results is unclear. Identification of a regional freight champion is the most consistently significant explanatory variable throughout the inferential statistical analyses.

Table 5.6 Multiple Regression Models for Subsets of Regional Population

	All MPOs		Less than one million		Between 50,000 and 350,000		Between 200,000 and 300,000	
Population within 500 miles, (pct.)	0.489 *		0.132		0.307		0.376	
	(0.302)		(0.318)		(0.349)		(0.439)	
Area (square miles)	0.034 ***		-0.009		-0.006		0.005	
	(0.006)		(0.033)		(0.044)		(0.049)	
Interstate	0.147 *		0.126		0.119		0.185	
	(0.083)		(0.084)		(0.089)		(0.120)	
Intermodal connector	0.179 ***		0.110		0.028		0.011	
	(0.057)		(0.061)		(0.079)		(0.076)	
Class 1 railroad	0.137 *		0.180 **		0.168 **		0.153	
	(0.080)		(0.081)		(0.080)		(0.095)	
NAAQs non- attainment	0.023		0.047		0.028		0.030	
	(0.069)		(0.071)		(0.079)		(0.096)	
MPO full-time staff (non-freight)	0.005 ***		0.015 **		0.020 **		0.030 **	
	(0.001)		(0.006)		(0.010)		(0.096)	
Regional freight champion	0.397 ***		0.334 ***		0.365 ***		0.363 ***	
	(0.066)		(0.070)		(0.085)		(0.107)	
Constant	-0.700 ***		-0.626 ***		-0.663 ***		-0.740 ***	
	(0.109)		(0.117)		(0.133)		(0.174)	
N	278		235		184		119	
R-squared	0.35		0.22		0.19		0.23	
Adj R-squared	0.33		0.19		0.15		0.17	

Notes: Robust standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 5.3 Conclusion

This chapter concludes with a discussion of the primary findings from the quantitative analysis of MPO freight planning capacity. One central finding is that the federal policy of designating MPOs as TMAs with associated increased levels of autonomy, authority, and responsibility has no effect on MPO freight planning capacity. The regression discontinuity models demonstrate no discontinuity at the cutoff of 200,000 people for the overall ability of an MPO to conduct freight planning as well as any of the four freight planning capacity subtypes. The use of urbanized area population thresholds forms a centerpiece of federal transportation policy. A minimum threshold of 50,000 is used as the determination of whether an MPO must exist. The 200,000 threshold determines whether an MPO is also designated as a Transportation Management Area. In the debate and negotiations that occurred in 2012 during the reauthorization of the surface transportation bill, draft legislation at one point included provisions for potentially eliminating MPOs with populations under 200,000 (see Fogel 2012; Frazee 2012; Snyder 2011). Federal policymakers consistently attribute importance to the 200,000 population threshold. The results from this research show that even with some policy distinctions on either side of threshold, at least in terms of an MPO's ability to conduct freight planning, nothing at all changes at a population of 200,000.

The transportation policy literature that emerged in the years and decades subsequent to the passage of ISTEA in 1991 routinely concluded that ISTEA-era surface transportation policy represented a significant advance in terms of providing more transportation planning authority to local and regional levels in contrast to the traditional dominance of state departments of transportation (e.g. Dilger 1992; Gage and McDowell 1995; Goetz, Dempsey, and Larson 2002; McDowell 2003). The literature specifically pointed to the increased authority and

autonomy provided to "large MPOs," the much easier to understand term for MPOs with TMA designations. Although the results show no connection between TMA designation and elevated ability to conduct freight planning, it is possible this policy mechanism has effects on other forms of transportation planning. Freight planning remains uncommon and is a relatively new province of public sector urban and regional planning. MPOs are generally small organizations with limited resources. Perhaps the increased authority, autonomy, and responsibility that comes with TMA designation does positively affect an MPO's ability to conduct transit planning or bicycle and pedestrian planning. While these transportation planning specialties are less common than the traditional focus on highway planning, they are much more prominent than freight transportation planning. The possibility, however, should also be considered that one of the centerpieces of federal policy for urban and metropolitan transportation has no discernable effect on the everyday practice of transportation planning at metropolitan planning organizations.

If federal policy in the form of elevated levels of authority, autonomy, and responsibility provided by TMA designation does not help explain variations in MPO freight planning capacity, then what accounts for high, average, and low levels of metropolitan freight planning capacity? The main results from the assessment of alternative explanations are less clear than the failure to reject the null hypothesis that emerged from the RD analyses. The multiple regression models suggest that the central variables to the RD models, TMA designation and regional population, are not important determinants of MPO freight planning capacity. The relative unimportance of regional population is somewhat surprising as population measures assume such primacy in federal transportation policy. The link between higher levels of regional population and greater need to conduct freight planning is intuitive in



that more people require more goods and transportation services. Variables representing measures of regional population, however, seem to be proxies for other variables such as geographic area and the number of MPO full-time staff.

Several variables obtained from sources external to the survey are interesting and warrant further investigation in the case study analysis. The binary indicator for presence of a federally-mandated intermodal connector is pertinent to this dissertation's research questions and focus on the efficacy of federal transportation policy in metropolitan freight planning. A sizable number of survey respondents also cited intermodal connections as one of the main freight transportation issues facing their MPO's region. Whether the binary indicator measures some level of freight activity, is a more direct impact of federal policy, or has some other relationship with MPO freight planning capacity is unclear.

The two explanatory variables derived from the survey responses consistently returned statistically significant results in multiple regression models. The number of full-time employees is a relatively concrete measure that may be less susceptible to respondent bias than more subjective questions. The binary indicator for the presence of a regional freight champion is a more problematic and, at the same time, potentially more interesting variable. The answer to the question of whether there is a regional freight champion is inherently subjective as what constitutes a regional freight champion is ill defined. One hypothesis is that because an MPO concurrently has limited resources and wide-ranging responsibilities the impetus for an MPO to allocate more resources for freight planning likely comes from an outside entity or coalition of stakeholders. Particularly, the literature review resulted in a conceptual framework hypothesizing that a regional coalition of freight stakeholders, potentially described as a regional freight regime, would encourage an MPO to increase its freight planning capacity. The

relationship between regional freight champions, regional freight coalitions, and MPO freight planning becomes an organizing focus of the case study research and analysis in Chapter 6.

## **6 Case Studies of Metropolitan Freight Planning**

This chapter presents the results of a cross-case analysis of freight planning in four metropolitan areas. The central aim of the chapter is to examine research questions pertaining to the relationship of MPOs to other regional organizations. Pattern matching constitutes the primary analytical method for the case studies. The chapter also directly builds on the results and findings from the quantitative analysis of the national survey on MPO freight planning. One of the main findings from Chapter 5 was the strong association between MPOs identifying their region as having a freight champion and higher levels of MPO freight planning capacity. This finding provides an organizing focus for this chapter and becomes a point of entry to examining MPOs within a broader context of multisector stakeholder organizations.

The results from the quantitative analysis of the national survey data also establish the population from which the cases were selected. As detailed in Chapter 3, case study selection consisted of selecting four cases based on two criteria: the identification or not of a regional freight champion and high or low levels of MPO freight planning capacity. While identifying a regional freight champion is different than participating in a coalition, a relationship between an MPO and a champion suggests the potential for interorganizational collaboration on freight transportation issues. The importance of champion organizations in regional regimes has also been highlighted in the urban regime theory literature, particularly in regards to leadership from high-level business organizations (e.g. Hamilton 2002; Hamilton 2004; Stone 1989).

The case study selection process yields four cases with Greenville and Grand Rapids appearing to support the expected pattern of the association between the identification or not of a regional freight champion and corresponding levels of MPO freight planning capacity (the 2x2 selection matrix is depicted in Figure 6.1). For the cases of Greenville and Grand Rapids, this chapter focuses on the questions of if, how and why the presence (or absence) of a regional freight champion corresponds with high (or low) levels of MPO freight planning capacity.

The case study selection methodology also provides two cases in Honolulu and Fort Meyers that appear to offer rival patterns of the association between the identification of a regional freight champion and MPO freight planning capacity. The examination of rival explanations strengthens the pattern matching analytical method for this cross-case analysis (see Yin 2014, 140). Fort Myers and Greenville are similar by not identifying a regional freight champion but diverge in outcomes, so the central question in the case of Fort Myers is why does the MPO have a high level of freight planning capacity even though there is no regional freight champion? Honolulu and Grand Rapids both specified a regional freight champion while diverging in outcomes, so the central question in the case of Honolulu is why does the MPO have a low level of freight planning capacity despite the presence of a regional freight champion?

Figure 6.1 Pattern Matching and Case Study Selection Matrix

Fort Myers, FL (No champion / High capacity) Rival Pattern	Grand Rapids, MI (Yes champion / High capacity) Expected pattern
Greenville, SC (No champion / Low capacity) Expected Pattern	Honolulu, HI (Yes champion / Low capacity) Rival Pattern

This chapter begins with an overview of regional contexts for the case studies of metropolitan freight planning including geography, population, history, economy, and freight activity. The organizational structure of the MPOs is also described in this section. The chapter then transitions to the results of the cross-case analysis. Each case will first be presented individually starting with Greenville, South Carolina and Grand Rapids, Michigan where cases appear to match the pattern of expected relationships between a regional freight champion and MPO freight planning capacity. The chapter then proceeds to Honolulu, Hawaii and Fort Meyers, Florida where the cases appear to contradict the expected pattern of relationships. The chapter concludes with a cross-case synthesis and discussion of the case study findings.

## **6.1 Regional Contexts**

### *6.1.a Geography and Population*

The four cases are situated with contrasting regional contexts. Fort Myers and Honolulu are both adjacent to the sea. While the beachfront location makes both regions popular for tourists, Honolulu has much more strategic importance for commerce and military serving as the United State gateway to the Asia and the Pacific Ocean. Grand Rapids and Greenville both grew in the nineteenth century because of their access to natural resources and location on rivers. The Grand River in Michigan propelled an expansive furniture manufacturing industry with vast nearby lumber resources. Grand Rapids is still known as Furniture City. Greenville, like many towns in Upstate South Carolina, grew around textile mills and the cotton industry. Greenville and Grand Rapids share a similarity in that they may be more economically tied to cities in other states than their own. Greenville is almost equidistant from Atlanta and Charlotte on the growing I-85 corridor. Grand Rapids

historically has had close connections to Chicago, the vast metropolis directly across Lake Michigan.

Of the four regions, Honolulu is by far the biggest city and metropolitan area (see Table 6.1 for an overview of the four regions). The Oahu MPO's jurisdiction covers essentially the entire island's population and represents 70 percent of Hawaii's population. State, county, and municipal levels of government share much of the same jurisdictional territory, sometimes blurring the distinctions as to what organization or agency has decision-making authority. By population, the Greenville MPO represents the fewest people of the four cases. However, South Carolina is not heavily populated and, resulting from strong growth in recent decades, more people now live Greenville County than any other county in the state.

Table 6.1 Overview of Case Study Regions

Region	State	MPO Name	2010 Pop	Freight Champ	MPO Capacity
Greenville	SC	Greenville-Pickens Area Transportation Study (GPATS)	547,397	No	Low
Grand Rapids	MI	Grand Valley Metropolitan Council (GVMC)	692,019	Yes	High
Honolulu	HI	Oahu MPO	952,502	Yes	Low
Fort Myers	FL	Lee County MPO	618,218	No	High

Note: Population from US DOT (2012)

Florida's tremendous number of visitors, nearly 95 million tourists visited in 2013 (Herald Staff Report 2014), sometimes overshadows how many people reside in the state. Florida in 2014 surpassed New York to become the country's third largest state behind California and Texas (Kunerth 2014). Although Fort Myers is home to more than a half million people, Miami, Orlando, Jacksonville, and Tampa are much bigger metropolitan areas with Tampa having a particularly large influence on Southwest Florida. While national news reports tend to focus on Detroit and its declining population, Grand Rapids and Kent

County are growing. From 2000 to 2010, Kent County grew by five percent whereas Michigan on aggregate lost population (U.S. Census Bureau 2000, 2010).

### *6.1.b Economy*

In terms of economics, industries, and employment, Greenville and Grand Rapids share many similarities. Both West Michigan and Upstate South Carolina have retained strong ties to manufacturing even as traditional industries have declined. The two regions are also very pro-business. Upstate South Carolina has been aggressive in attracting foreign investment, particularly from German companies. BMW is the most famous of the foreign multinationals, and Michelin is another major employer. With its bustling downtown and gleaming new construction, Grand Rapids counters the popular conception of a declining rust belt city founded on manufacturing. The influence of the region's businesses, especially Amway, and their families is profound. The story of the region's resurgence is so commonly told that it is included in the introduction to Grand Rapids in a Michigan travel guidebook:

"Much of the redevelopment can be attributed to the area's loyal and exceedingly generous business community, a group that includes the headquarters for the Meijer Corporation (pioneers of the dual grocery / discount store phenomenon) and Amway, that genius of direct marketing, which racks up annual sales in the billions. The names DeVos and Van Andel – the founding families of Amway – seem to top the list of every charitable cause in town." (Martone 2014)

Honolulu and Fort Myers, in contrast, have few manufacturing jobs but substantial tourism industries (see Table 6.2). Honolulu with Waikiki Beach is a world famous destination. While Honolulu and Hawaii were once major agricultural producers, those businesses have long since moved elsewhere. Today, most of the products bought and consumed on the island of Oahu are shipped in from elsewhere. Honolulu culturally, economically, and geographically has strong connections to Asia and Japan in particular.

With so much focus on tourism it can be forgotten how large a presence the US military has in Oahu. The influence of the military on the Honolulu economy is not captured in the location quotients presented in this chapter, as these labor statistics consist solely of civilian employment. However, the US Census estimates the 2013 armed forces employment in Honolulu at approximately 40,000 (U.S. Census Bureau 2013). One interviewee underscored the importance in stark terms, saying that the entire island's economy would collapse if the military left.

Table 6.2 Location Quotients for Case Regions by Major Occupational Group, 2013

Major Occupational Group	Greenville	Fort Myers	Honolulu	Grand Rapids
Management	0.93	0.61	1.25	1.03
Architecture and Engineering	1.53	0.41	1.01	1.18
Food Preparation and Serving Related	0.98	1.46	1.26	0.86
Building and Grounds Cleaning and Maintenance	1.07	1.50	1.60	0.93
Sales and Related	0.98	1.44	0.97	0.95
Farming Fishing and Forestry	0.16	1.95	0.39	0.28
Construction and Extraction	0.79	1.45	1.14	0.74
Production	1.92	0.41	0.37	2.02
Transportation and Material Moving	1.08	0.75	0.92	1.02

Note: Data from U.S. Bureau of Labor Statistics (2013). Location quotients calculated using the United States as geographical reference.

Tourism is important to Southwest Florida and Fort Myers, but the tourist industry functions in a different manner than in Hawaii. In addition to seasonal tourists, the region attracts numerous retirees who either move there permanently or maintain a second home for the colder months. The development boom in this region supports industries like construction but is also susceptible to economic downturns. When the Great Recession began in 2008, Southwest Florida was one of the hardest hit regions in the country. In 2008, Lee County, Florida had the highest rate of foreclosures in the United States, and when President Obama gave a major speech promoting the “stimulus” in 2009 he did so in Fort Myers (Cave 2009;



President Obama’s Remarks in Fort Myers, Fla 2009). The median home sale price in the Fort Myers metropolitan area plummeted from a peak of \$322,300 in 2005 to \$106,900 in 2008 (Cave 2009). There is a substantial agricultural industry in this part of Florida, which supplies much of the United States with fruits and vegetables during the coldest months.

### *6.1.c Freight Volumes and Infrastructure*

Of the four case study regions, Honolulu has the most active freight facilities, ports, and terminals. The Honolulu Harbor ranks as the eleventh busiest container port in the United States (U.S. Army Corps of Engineers 2014). The Honolulu airport is also a major cargo hub, ranking fifteenth among American airports in terms of air freight weight (see Table 6.4). Greenville is an important thoroughfare for trucking and freight railroads in the I-85 and Crescent Corridors. Almost every truck and train heading from Atlanta to Charlotte traverses Greenville County.

Class 1 railroads serve Grand Rapids, but there are no major intermodal or transload facilities. Most of the goods coming to and from the Furniture City are transported by truck. Chicago is a primary origin and destination for heavy trucks. Fort Myers is served by Interstate 75, which functions as the primary transportation connection between the Tampa metropolitan region and Southwest Florida. Lee County does not have a seaport, but it is home to a short line railroad: Seminole Gulf. Seminole Gulf connects to CSX and the Class 1 network near Tampa, and its business includes hauling construction material and scrap metal.

**Table 6.3 Major Freight Infrastructure and Facilities by Case Region**

Region	Class 1		Intermodal		
	Interstate	Railroad	Seaport	Airport	Rail
Greenville	X	X		X	X
Grand Rapids	X	X		X	
Honolulu	X		X	X	
Fort Myers	X			X	

All four case study regions have commercial airports, although Honolulu's dwarfs the others in terms of passenger and freight volumes (see Table 6.4). The airports for Grand Rapids, Greenville, and Fort Myers could be considered in a second or third tier of airports and often lose travelers to busier hub airports located within driving distance.

Table 6.4 Airport Freight and Passenger Volumes by Case Region, 2013

	Rank by Cargo Weight	Cargo Weight	Rank by Passengers	Passenger Enplanements
Greenville	85	213,414,150	89	917,088
Grand Rapids	78	243,094,596	84	1,123,257
Honolulu	15	2,116,335,200	27	9,466,995
Fort Myers	109	113,325,000	47	3,788,870

Note: Cargo is landed weight in pounds; Source: FAA (2014)

The differing levels of freight volumes as well as the connection between manufacturing and transportation industries are reflected in the civilian occupational data for the four regions. With a location quotient greater than one, both Grand Rapids and Greenville are specialized in the overall Standard Occupational Classification (SOC) category of Transportation and Material Moving Occupations (see Table 6.5). Truck driving is a particularly important occupation in Grand Rapids where one in forty people work driving a truck. The relatively low transportation and warehousing location quotient in Honolulu is a likely a result both of the island's diversified economy and also because trucking is essentially limited to last-mile logistics and delivery.

Based on infrastructure, economic industries, freight volumes, and employment it would be reasonable to predict that freight planning would be important in Greenville, Grand Rapids, and Honolulu and have a peripheral status in Fort Myers. The findings from the national survey of MPO freight planning, however, contradict this prediction as only Grand Rapids matches high freight activity and transportation employment with a corresponding

level of MPO freight planning capacity. The incongruous relationship between regional contexts and MPO freight planning capacity will be examined in greater detail in the analyses of Greenville, Fort Myers, and Honolulu.

Table 6.5 Location Quotients and Employment for Select Occupations, 2013

Occupation Category and SOC Code	Greenville	Fort Myers	Honolulu	Grand Rapids
Heavy and Tractor-Trailer Truck Drivers (533032)	0.92 3,340	0.59 1,500	0.47 2,480	1.47 6,970
Light Truck or Delivery Services Drivers (533033)	1.13 2,010	1.12 1,390	1.24 3,210	1.30 3,030
Laborers and Freight Stock and Material Movers Hand (537062)	1.48 7,750	0.78 2,850	0.71 5,400	1.04 7,090
Packers and Packagers Hand (537064)	1.83 2,810	0.58 620	0.58 1,300	1.27 2,550
Transportation and Material Moving Occupations (530000)	1.08 22,220	0.75 10,760	0.92 27,540	1.02 27,630
All Occupations (000000)	302,970	211,080	441,250	397,380

Note: Data from U.S. Bureau of Labor Statistics (2013). Location quotients calculated by author using the United States as the geographical reference.

#### *6.1.d MPO Characteristics*

The MPOs in the four regions have varying organizational structures and jurisdictional considerations. The Lee County MPO in Fort Myers is an independent organization separate from the county government, but its jurisdiction lies solely within Lee County. The MPO is bordered directly by the Collier County MPO to the south and the Charlotte County MPO to the north.

The MPO for Grand Rapids is part of a larger organization named the Grand Valley Metropolitan Council. The umbrella organization has a broader jurisdiction, akin to a council of governments.

The Greenville – Pickens Area Transportation Study (GPATS) has a somewhat complicated jurisdiction that covers portions of five counties and twelve municipalities

(GPATS undated). The South Carolina Inland Port in Greer offers a good example of jurisdictional complexity in Upstate South Carolina. The municipality of Greer extends into both Greenville and Spartanburg Counties, and while the inland port is located in Spartanburg County it is within the geographic jurisdiction of the Greenville MPO and not the Spartanburg MPO.

The jurisdictional boundaries of the Oahu MPO overlap with the City of Honolulu, Honolulu County, and most of the population represented by the state. Somewhat unusually, members of the Hawaii State Senate and House of Representatives including the chair of each body's transportation committee, as required by state law, are members of the Oahu MPO's Policy Committee. This requirement has led to the situation of a person representing portions of another island with a voting position within the Oahu MPO. For decades, the Oahu MPO was the only MPO in the state of Hawaii. However, the urbanized area of Lahaina on Maui crossed the 50,000 person threshold in the 2010 decennial census, and as of September 2014 the Maui MPO was in the process of being created (State of Hawaii Department of Transportation 2014).

## **6.2 Greenville, South Carolina**

Between the administration of this study's national survey of MPO freight planning in the summer of 2012 and field visits in the summer of 2014, the South Carolina Ports Authority (SCPA) planned, built, and opened an inland port in Greer. The intermodal container facility connects the Upstate and the I-85 Corridor to the state's main port facilities in Charleston. Overnight rail service to and from the inland port is provided by the Class 1 railroad Norfolk Southern. Perhaps even more importantly, the inland port is directly proximate to the BMW manufacturing campus.

Findings from the survey indicated that GPATS, the MPO for Greenville, had a low level of freight planning capacity. A field visit, interviews, and documentary analysis corroborate that finding. Interviewees characterized the organization's freight planning efforts as minimal. The MPO works primarily on passenger transportation and quality of life issues. During the time period of the field visit, a major focus of the MPO and other organizations was an effort in Greenville County to raise the sales tax to fund transportation improvements and repairs for the county's roads and bridges. Several months after the fieldwork was completed, Greenville County voters in November 2014 rejected the county's sales tax referendum by a two-to-one margin (Bell 2014).

Improving quality of life for Greenville County's residents was a consistent theme throughout the interviews. Economic development organizations in the county viewed quality of life, including the ability of people to get to and from work, as a central component of attracting and retaining businesses to the area. One senior official suggested that freight-based economic development may be more appropriate for neighboring Spartanburg County, which has cheaper land and is less affluent, and that Greenville County was more focused on attracting corporate headquarters.

It may be surprising that the Greenville MPO did not indicate a regional freight champion as the Upstate is home to major manufacturing facilities with BMW at the epicenter. However, interviewee after interviewee corroborated that view. Upstate South Carolina is a very pro-business region, and it is possible that there may be too many organizations working on issues relating to growth, transportation, and economic development. In the 120-mile stretch of I-85 from North Carolina to Georgia there are three MPOs, a council of governments, at least seven chambers of commerce, economic

development organizations, and umbrella organizations connecting these groups. While there is a general spirit of cooperation in promoting the region, coordination among the many entities is challenging. Several people within the transportation field suggested that the three Upstate MPOs should be combined into one organization but that such an effort would be politically infeasible. The different towns in the Upstate are historically distinct, but with recent rapid growth these distinctions begin to blur while political boundaries remain.

An additional surprise that emerged during the field visit was that interviewees generally did not cite BMW as the regional freight champion. BMW features prominently in the economy of the Upstate, and the German multinational has been very active recently, announcing a \$1 billion expansion in the spring of 2014 (Leach 2014). The seeming paradox of centrality and low profile may actually indicate just how powerful and influential BMW is. Take, for example, the commonly-told story of the process of deciding to build the \$51 million inland port in Greer. As recounted by interviewees and newspapers, the project was launched with a phone call from the CEO of Norfolk Southern to Governor Nikki Haley (Fair 2014). Norfolk Southern contributed \$6.5 million to the project with the port authority and state paying for other \$44.5 million (Leach 2014). BMW does not appear as an actor in the story of the inland port's creation nor in its funding. The official press release from the South Carolina Port Authority announcing the opening of the inland port does not mention BMW (Officials Celebrate Inland Port Opening with Norfolk Southern Inspection Train 2014). But their desire to have and use the facility was the driving force behind the project. The inland port even functions as a form of warehouse for BMW. Loaded containers sit in stacks within the inland port until they are needed. BMW then contacts the port and a drayage truck

brings the container from the port to the BMW facility. A driver has a maximum of 45 minutes to complete this task.

The actors in the planning, building, and opening of the inland port all operate at very high levels of business and government. Two interviewees remarked using the exact same words: "When the port says 'Jump.' The rest of the state says 'How high?'" Speakers at the inland port's opening included Governor Nikki Haley, Senator Lindsey Graham, the CEO of Norfolk Southern, and several members of Congress. And then there is BMW. From the early 1990s when they decided to locate their first North American manufacturing facility in Greer, South Carolina, they have maintained strong connections to the governor. The final details for the initial manufacturing facility were completed over wine and cigars poolside at the Governor's mansion (McDermott 2011). Later when BMW donated \$10 million to help build Clemson University's International Center for Automotive Research (I-CAR) facility in Greenville County, they chose to name the center not after their company but after Carroll A. Campbell, the South Carolina Governor with whom they completed the initial negotiations (McDermott 2011).

The reason why many consider Greenville and Upstate South Carolina to be without a freight champion is because the major players operate at higher levels both in terms of geography and power. The decisions around the inland port were made at the state level and through very influential organizations and individuals. BMW and Norfolk Southern do not need strong relationships with the Upstate MPOs when they have direct access to the governor. South Carolina also does not have an extensive history of home rule and decision-making has often occurred at state and not municipal or county levels.

But that does not mean that Greenville's MPO and other regional organizations have no role in freight planning. The inland port was planned and built quickly without much study on how it would affect local transportation networks. The head of the South Carolina Ports Authority frequently cites the benefits of the inland port in reducing congestion on I-26, the interstate that connects Charleston to the Upstate, while admitting it is unclear how the facility will affect the I-85 corridor. Six months after the opening of the inland port, GPATS commissioned a study to assess the port's impact on local and regional road networks (Bell 2014). The decision-making for the inland port may have been made at the state level and above, but there will be definite local impacts of the project.

Efforts to increase funding for transportation infrastructure have also primarily emerged from the local level in South Carolina. The state's gasoline tax is one of the lowest in the country and has not been raised since 1987. Many interviewees expressed great frustration with the state leadership in terms of increasing transportation funding. Indeed, there is a stark contrast between the ability to plan, build, and open an inland port facility in less than two years and the inability to repair structurally deficient bridges. The port authority has the ability to raise revenue for capital improvements through user fees as well as issuing municipal bonds whereas increased funding for transportation projects in Greenville must be approved by voters for sales tax or the state legislature for gasoline tax.

### **6.3 Grand Rapids, Michigan**

Grand Rapids, of the four case study regions, matches most closely with this study's hypotheses and expectations regarding the work of MPOs in relationship to a regional freight champion and a regional regime or coalition of freight stakeholders. Grand Rapids positions itself as a very pro-business region, and in 2014 the major companies and business



organizations have a sharp focus on transportation infrastructure, freight, and logistics. Business organizations in Grand Rapids are currently undertaking a project which is essentially a regional freight planning study funded and conducted by entities representing the private sector.

The main organizations representing the region's businesses are the Grand Rapids Area Chamber of Commerce, the entity identified by the MPO as the regional freight champion, and The Right Place, an off-shoot of the Chamber that now functions as a separate organization that works on bringing new companies into West Michigan as well as promoting the region's overall economic competitiveness. Grand Rapids has a large-scale manufacturing industry, epitomized by the success of Amway whose global headquarters is located in Ada just east of downtown Grand Rapids.

Major businesses in Grand Rapids have become increasingly concerned about rising logistics costs, a chronic shortage of truck drivers, and the difficulties presented by trucking goods to and from Chicago, so they have begun pursuing alternative means of transporting freight. Specifically, there is an interest in assessing whether or not Grand

Figure 6.2 Map of Greenville, South Carolina Metropolitan Region

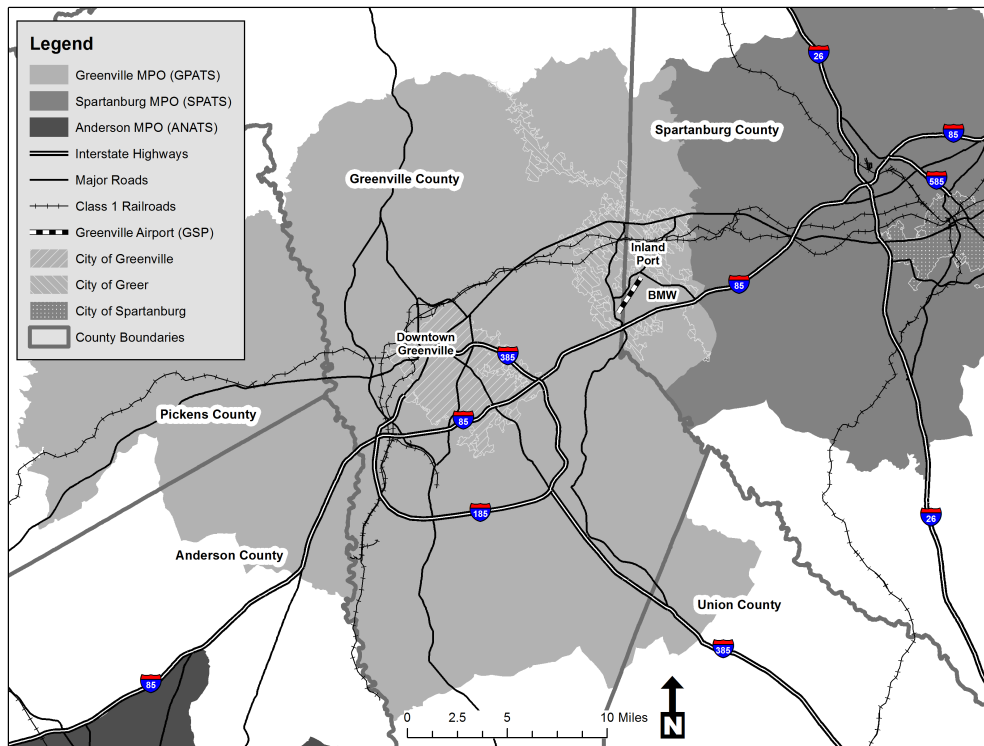
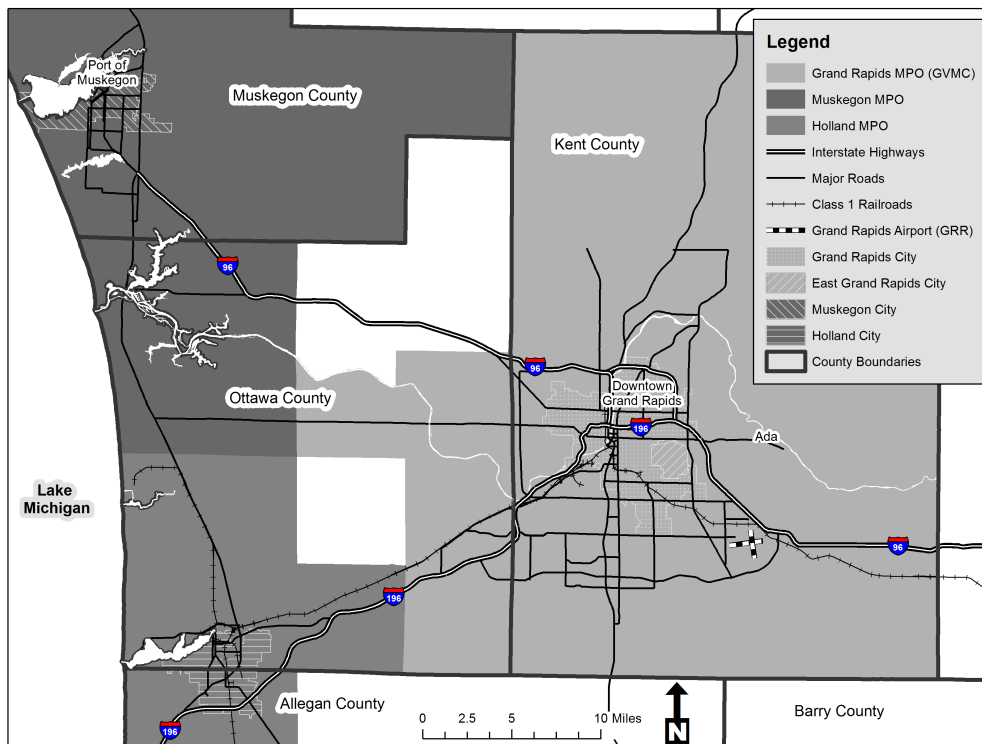


Figure 6.3 Map of Grand Rapids, Michigan Metropolitan Region



Rapids can support intermodal rail. Grand Rapids is directly connected to Chicago by a Class 1 railroad, but there is not a major intermodal transfer facility in the region.

In an effort to evaluate the feasibility of intermodal rail, the business organizations attempted to obtain freight movement data from the railroad. The railroad declined, and so The Right Place and the Grand Rapids Area Chamber of Commerce decided to create their own freight flow and logistics study and model. Representatives from the two organizations met with senior officials from some of the largest businesses in the region for an extended interview about their freight and logistics needs as well to obtain origin and destination data about their shipments. Results from the project may help improve the competitive advantage of the region's businesses by lowering freight and logistics costs. There is also an added benefit of gaining a better understanding of how the freight transportation system functions in West Michigan. Or, as one economic development expert expressed it, "to sort some of this shit out."

The MPO for the region, the Grand Valley Metropolitan Council (GVMC), is involved in the freight planning and logistics efforts but is not the lead organization. GVMC attends the meetings and promotes the freight and logistics effort but, at this stage, is definitely a supportive organization. Results from this study's national survey indicated that GVMC has a high level of freight planning capacity. Freight is a focus within the MPO, but the responses to the survey questions may overstate the organization's capacity in that portions of the regional freight planning work are done externally to GVMC.

The supportive role of the MPO in Grand Rapids freight planning is not necessarily negative or a criticism of GVMC's work. Many of the freight transportation issues in the region would be difficult for an MPO to address. The region's manufacturing and production

industries require many truck drivers, and there is a substantial truck driver shortage. To illustrate that point, one person close to the trucking industry has had companies tell him that they would immediately hire fifteen new drivers if they could and that additionally “there's five or six drivers they'd fire if they could find people to replace them because they are not as good as drivers.” Planners from the MPO identified the driver shortage as one of the most pressing freight issues in Grand Rapids and seemed unsure of how to address this problem. MPOs may have wide-ranging responsibilities, but increasing the pool of truck driving employees is probably beyond their scope of influence.

The regional freight planning effort led by the Chamber and The Right Place is likely more effective at this stage if the MPO has a more peripheral role. West Michigan is a business-oriented region, and interviewees stressed that influential people and organizations often prefer private sector solutions to problems rather than efforts originating from government. Additionally, obtaining freight data is notoriously difficult as it is largely proprietary, and companies are wary of both competitors and the public accessing the information. By having two well-respected business organizations perform the study, they would likely have better success in acquiring freight data than a similar effort performed by the MPO.

The respect, authority, and centrality of the Grand Rapids Area Chamber of Commerce and The Right Place are important in establishing a foundation for freight planning efforts originating in the private sector. Many interviewees spoke about the widespread cooperation that occurs in the region and how organizations from multiple sectors work well together. When asked the reason for this cooperation, interviewees offered explanations like, “That’s just West Michigan.” The term West Michigan is often used to

symbolize a pro-business and politically conservative region. People and organizations in Grand Rapids are highly connected with many executives sitting on each other's boards. West Michigan has a prominent Dutch heritage from settlers who arrived in the 1800s seeking religious freedom, and their cultural and religious heritage still shapes the region today.

The founding families of Amway, the DeVos's and Van Andel's, have a pronounced influence on Grand Rapids. Amway owns three downtown hotels. The sports and entertainment stadium is the Van Andel Arena and conventioners congregate at the vast DeVos Place. Grand Rapids has had a robust regional pro-business regime that dates back at least three decades to the decision of Rich DeVos and Jay Van Andel to buy, renovate, and operate the historic downtown Pantlind Hotel and reopen it in 1981 as the Amway Grand Plaza Hotel (DeVos 2014; Van Andel 1998). Support from high-level executives has helped freight transportation, trucking, and rail freight become a prominent issue within the Grand Rapids business community. Concerns over rising logistics concerns at Amway helped spur the regional freight planning study undertaken by the two business organizations (Manes 2013).

The close-knit business community is undergirded by the remarkable stability of company leadership over decades. Two prominent companies, Amway and Meijer, while massive are still family businesses run by the sons of the founders. Grand Rapids is growing, and many of the people who live there tend not to leave. About four of five residents of Grand Rapids were born in Michigan, a rate of residents born-in-state far above the national average as well as the other three case regions (see Table 6.6). The head of transportation planning at GVMC has worked at the MPO for twenty-one years. And the person who

originally hired him still works in the region as the head of the Kent County Road Commission.

Table 6.6 Born in State Population by Case Study Region, 2010

Region	Born in State of Residence	Total Population	Born-in- State Rate
Grand Rapids, MI	607,406	777,159	78%
Greenville, SC	366,691	638,721	57%
Honolulu, HI	517,303	955,215	54%
Fort Myers, FL	162,890	624,155	26%
USA	181,504,577	309,138,711	59%

While the influence of the business coalition supported the expected pattern of emphasizing freight issues with city and regional planning organizations, the private-sector freight planning initiatives were surprising and likely constitute innovative planning.

#### **6.4 Honolulu, Hawaii**

There is a commonly shared belief in Honolulu that there are never more than three days of food and supplies on the island of Oahu. Whether or not that claim is true, it is undeniable that almost everything on Oahu has been imported from somewhere else. While most of the United States also relies on an interconnected global supply chain, Honolulu and Oahu do not have access to the country's primary form of freight transportation: long-distance trucking. All goods arrive to the island on ship or airplane.

Honolulu has the largest population of the four case study regions. It is the only one with seaport and a major one in that regard. The tourist industry is consumption based and requires a reliable availability of goods. Because of the centrality of goods movement to the daily existence of Honolulu, the finding from the survey analysis that the Oahu MPO had minimal organizational capacity to conduct freight planning was therefore surprising. While the Oahu MPO likely has a higher level of freight planning capacity than reported in the

survey – they have conducted a sea level rise study with many connections to freight (Oahu Metropolitan Planning Organization 2011), for example – a field visit, interviews, and documentary evidence confirm a low capacity for freight planning.

Ocean-going vessels dock at the Honolulu Harbor where many unload containers full of goods. Those containers are picked up by trucks, leave the container yard, and are then transported somewhere. Where those containers and trucks go after that is largely unknown. At one of the major ocean carriers, the yard manager was not too concerned with the whereabouts of his containers. "It's an island," he remarked casually with a shrug of his shoulders. "They can't go too far."

Gaining a better understanding of where the trucks and containers go after they depart the Honolulu Harbor is a project of interest to the Oahu MPO. And they recently planned on dedicating a small amount of money, \$20,000 in staff time, to begin that study. Yet, due to budget constraints, that \$20,000 and the project were later canceled.

The Oahu MPO does not just have low freight planning capacity; its overall transportation planning capacity is quite limited. Interviewees and newspaper reports characterize MPO transportation planning processes as less-than-rigorous. In one 2014 article a professor at the University of Hawaii and the head of the Oahu MPO both used the term “rubber stamp” to describe the work of the MPO and the function of its policy committee, respectively (Cocke 2014). The Hawaiian statutes that legally establish the Oahu MPO seemingly have not been updated since the 1970s they cite the federal transportation acts of 1964 and 1973 and characterize the overall purpose of MPOs “to act as an advisory urban transportation planning organization and to receive certain funds for the purpose of carrying out continuing, comprehensive, cooperative urban transportation planning” (Haw. Rev. Stat.

§ 279e-7). That interorganizational arrangement directly conflicts with the policy process established by ISTEA in 1991 and continued in subsequent federal surface transportation legislation. The head of the Oahu MPO, in reference to the seeming disjuncture between federal policy and metropolitan transportation planning in Honolulu, remarked, “the ISTEA revolution, if you will, never happened in Hawaii.”

The state of Hawaii seems ideally suited for integrated multimodal transportation planning. The state's department of transportation has three divisions: Harbors, Highways, and Airports. Additionally, there is a statewide planning office with the purpose of coordinating planning within the agency. To what extent the Hawaii Department of Transportation (Hawaii DOT) incorporates these modal divisions is unclear. Hawaii DOT officials from each of the divisions declined requests for interviews for this study. Transportation professionals interviewed for this study were also unaware of how and to what extent Hawaii DOT incorporates freight into their planning efforts.

In recent years, the leadership of the Oahu MPO has attempted to gain more authority to carry out what they believe is the MPO's role in metropolitan planning as stipulated by federal law. The public perception of the Oahu MPO is perhaps reflected in the language employed by the major local newspaper, *The Honolulu Star-Advertiser*, that recently characterized the MPO as “a somewhat obscure transportation planning agency” (Honore 2014). Disagreements between the Hawaii DOT and the Oahu MPO have increased in recent years and spiked in 2014 with the MPO becoming more vocal about the possibility of becoming decertified by the US Government. All MPOs that are TMAs must be certified every few years in a joint effort by the FTA and the FHWA. MPO certification processes are generally cooperative and rarely result in punitive measures as the federal government has



tended to take an “educate more than regulate” approach to MPOs (McDowell 1999, 24). As of 2009, “according to DOT officials’ knowledge, no MPO has failed to be certified as a result of a certification review” (GAO 2009).

While the rhetoric about potential decertification reported in local newspapers (e.g. Cocke 2014; Honore 2014) may have seemed like political posturing, the subsequent results of the certification process were quite damning. The report, which was released after the conclusion of the field visit, documents “key observations” including (USDOT 2014):

- The 2008 Comprehensive Agreement, which is the only operating agreement or OahuMPO, does not meet federal requirements.
- The MPO Policy, Executive and Technical Advisory Committees do not have defined or documented governance.
- The MPO lacks adequate documentation of the procedures used to develop, amend or modify key metropolitan planning products.
- The MPO lacks documentation for the coordination and procedures for data collection, maintenance and sharing.
- MPO staff does not have the technical capacity necessary to fully implement federal requirements.
- MPO staff does not follow documented procurement and administration practices.
- Several required MPO planning products do not fully meet federal requirements.

The report includes a long list of required “corrective actions” with deadlines for compliance and consequences for non-compliance including MPO decertification and non-approval of Hawaii’s State Transportation Improvement Program (STIP).

Efforts to resolve these issues and bring the Oahu MPO into compliance with federal statutes and regulations are ongoing and may be challenging. “The state has notions of being royalty,” commented one interviewee with decades of transportation experience on Oahu. However this conflict is resolved, its fractious nature suggests that it will be some time before there is a functional intergovernmental planning process. And if the MPO lacks the

capacity to perform some of the essential functions of their federal responsibilities as the Certification report concludes, the explanation for the low level of freight planning capacity makes much more sense.

Absent in the above discussion of the overall limited capacity of the Oahu MPO and conflicts with the Hawaii DOT is the identified regional freight champion, the Hawaii Transportation Association (HTA). The HTA is the Hawaiian unit of the American Trucking Association (ATA), an influential industry group that promotes trucking nationally. In contrast to trucking in most the rest of the United States, the trucking industry in Hawaii is relatively small, especially if separated from package delivery services like UPS, FedEx, and the United States Postal Service. One interviewee proposed the following challenge: “If you really wanted to push me you’d ask me what the three largest trucking firms are in Honolulu. I couldn’t tell you.” There are many small trucking firms as well as owner / operators. Trucking companies in Honolulu and Oahu struggle as well with finding qualified drivers. Driving construction vehicles, interviewees reported, pays more. Honolulu had an seasonally-adjusted unemployment rate of 4.2 percent in May, 2013, which was by far the lowest level of the four case study regions (U.S. Bureau of Labor Statistics 2014).

The HTA has been active in the MPO for at least one decade, but it is a one-person organization with limited resources. Connections from the Oahu MPO to freight stakeholders do not extend beyond the HTA to ocean carriers or airlines. So while the Oahu MPO identified a regional freight champion and has a long-standing relationship with the organization, the HTA by itself may not have enough influence to elevate the prominence of freight within the Oahu MPO, especially when considering the MPO’s overall low levels of organizational capacity and authority.

If there is a freight coalition or regime in Oahu, the MPO is not part of it. There is a Honolulu Harbors User Group comprised of major businesses and industry groups including Matson, Horizon Lines, Chevron, Tesoro, and Norwegian Cruise Lines (State of Hawaii Department of Transportation 2012). And then there is the military with its large and influential presence. Pearl Harbor is famous, in part, because of its vital importance to military logistics.

Although the MPO has low freight planning capacity and highway trucking is much less important in Hawaii than in most states, there are still major freight transportation issues in Honolulu. An MPO would well-situated to address some of these issues because of the focus on metropolitan and urban transportation. Honolulu has challenges with last-mile logistics and urban freight delivery. These problems are acute in Waikiki Beach, the central tourism location. On the crowded roads of Waikiki, freight trucks grapple for space with vacationers, residents, transit buses, and travel tour buses. Tour group companies are a major provider of transportation in Honolulu, moving visitors all around the island. And tour buses often load and unload passengers in the same space where trucks make deliveries. An MPO with greater capacity and authority could use its metropolitan planning processes and resources to help address issues like urban freight delivery that directly impact the island's transportation system and economic vitality.

## **6.5 Fort Myers, Florida**

Fort Myers is an unlikely place to find a transportation planning organization with a high capacity to conduct freight planning. There is no seaport and no Class 1 railroad. There is no identified regional freight champion, and there are relatively few organizations directly involved with freight transportation. The major industries involve tourism, retirees, and

services catering to the temporary and permanent migrants heading to Southwest Florida.

The Lee County MPO, named after the county it represents, has a freight plan, conducted a rail corridor study, and a staff planner participated in Florida's Trade and Logistics Academy in 2014.

The lack of a regional freight champion became apparent in fieldwork. Before, during, and after the Southwest Florida visit, it was difficult to find people to interview about freight planning, primarily because they were not actively involved in the movement of goods. "Have you talked to the Lee County MPO?" was a common response for an interview request. If there is a regional freight champion for Fort Myers it is the Lee County MPO, and they did not identify as one.

While Fort Myers, Lee County, and much of Southwest Florida do not have a seaport, a Class 1 railroad, major distribution centers, or a large manufacturing industry, the region still contends with freight transportation challenges. A commonly-cited issue is the "backhaul problem." Many of the trucks bringing goods to this region travel south

Figure 6.4 Map of Honolulu, Hawaii Metropolitan Region

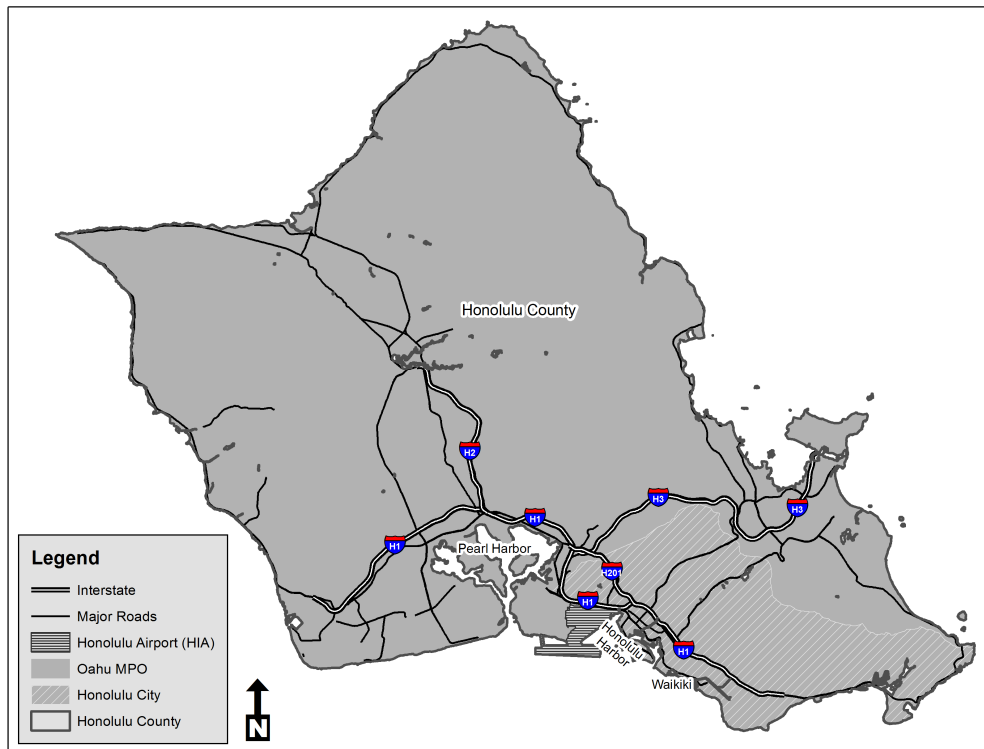
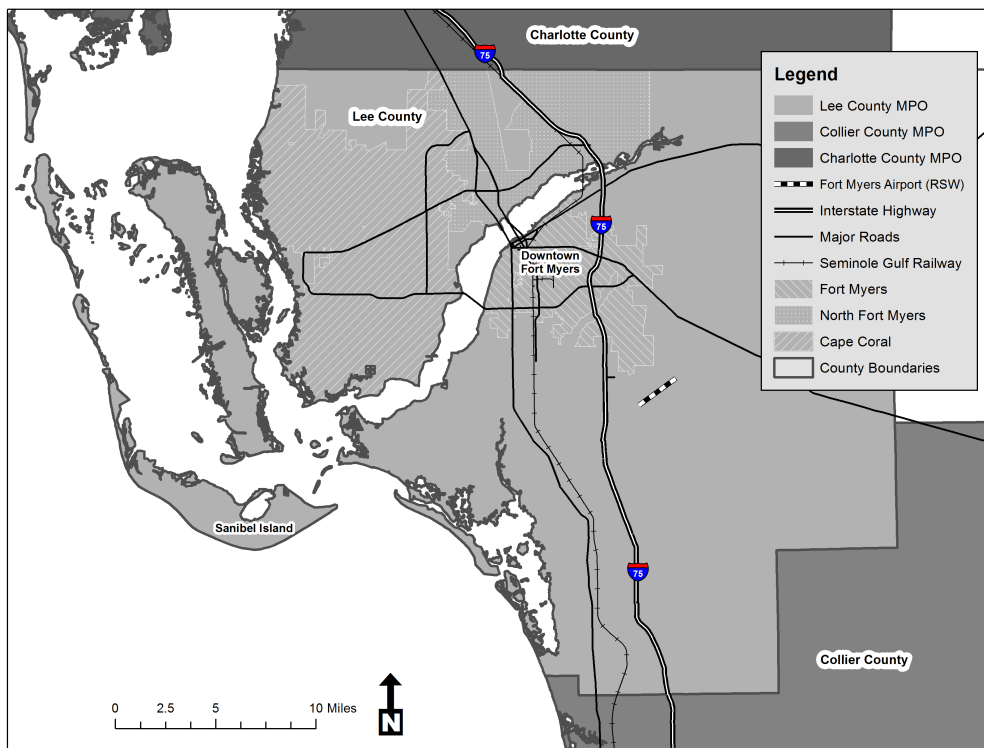


Figure 6.5 Map of Fort Myers, Florida Metropolitan Region



from Tampa with their trailers full and return back north mostly empty. The excess northbound capacity provides opportunities for businesses in Southwest Florida as the rates are relatively low, but there remains plenty of excess trucking capacity. A second issue occurs because the tourist season coincides the heaviest levels of agricultural production. The concurrent peaks of the tourist and tomato seasons compound regional transportation congestion.

The primary reason, however, that the Lee County MPO emphasizes freight transportation planning is because of the prioritization of freight transportation and logistics at the state level. The state of Florida and the Florida Department of Transportation (FDOT) have promoted freight planning and that emphasis has grown since Rick Scott was elected governor in 2010. Within FDOT there is now a modally integrated office of Freight, Logistics, and Passenger Operations. The state has a collaborative initiative with major business organizations called Freight Moves Florida. And, recently, FDOT has begun its Trade and Logistics Academy designed to increase freight knowledge and capacity with public sector transportation officials and employees.

Florida's emphasis on freight transportation extends to funding and allocating state and federal financial resources. For the Lee County MPO in Fort Myers that leads to featuring freight components in their plans and work efforts, which improves their competitive position for funds. As was explained in a field interview, "you have to find ways of finding the funding and if...freight is one way of getting the funding so be it we will go for that."

One reason that the Lee County MPO is assertive in its planning efforts and works to align the priorities of Fort Myers and the state likely results from the size and influence of

Southwest Florida relative to other areas within the state. Although the Lee County MPO represents over 600,000 people, it is still only the ninth largest MPO by population in Florida. In order for the Lee County MPO to compete with these larger regions for funds they may need to take a more assertive and entrepreneurial approach to planning.

There are also a large number of MPOs in Florida. With 26 MPOs, Florida has more of these transportation planning entities than any other state. Florida has a long tradition of state support for planning including, until recently, the requirement that local comprehensive plans be consistent with state plans. The influence of Florida's leadership in state-mandated local planning has been extensively studied, especially in regards to hazards mitigation (e.g. Berke, Lyles, and Smith 2014; Brody, Highfield, and Carrasco 2004; Brody, Kang, and Bernhardt 2010; Burby and May 1998; May and Burby 1996). Florida has a statewide organization called the Florida Metropolitan Planning Organization Advisory Council (MPOAC), comprised of the twenty-six MPOs, for the purpose of sharing resources, building capacity, and working together on MPO issues. MPOAC has a freight committee, and this may be the only statewide MPO committee on freight in the United States. One member of MPOAC's Freight Advisory Committee stressed that a primary objective of the committee is to make sure that MPOs maintain an central planning role as the state of Florida increasingly focuses on freight transportation planning.

Compared with a region like Greenville, South Carolina and its large manufacturing base and significant highway and rail freight volumes, it is unexpected to find an MPO with high levels of freight planning capacity in a portion of Southwest Florida where goods movement is not as central to the region's economy and transportation system. The case of Fort Myers suggests how strong leadership at the state level may increase the organizational

capacity for freight planning at local and regional levels. Linking increased opportunities for funding with projects that support freight is a policy option that provides direct incentives for elevating the role of freight within an MPO.

Further analysis of the national survey data supports the conclusion that policies and leadership at the state level influences the freight planning capacity of Florida MPOs. While the Lee County MPO did not identify a regional freight champion, three other MPOs specified either FDOT or a district division of FDOT as their region's freight champion. MPOs in Florida have, on average, much higher levels of freight planning capacity compared with their peer MPOs in other states (see Table 6.8). Twenty of the twenty-six Florida MPOs responded to the survey with a mean freight planning capacity score of 0.28, which is a statistically significant difference from the mean score of -0.02 of the other 258 responding MPOs.

Table 6.7 MPO Planning Capacity: Florida and Rest of USA

Size	Florida		Rest of USA		Significant Difference?
	n	Mean Capacity	n	Mean Capacity	
Small	5	-0.30	129	-0.17	
Medium	10	0.26	91	-0.03	*
Large	5	0.93	38	0.51	
All	20	0.28	258	-0.02	**

Notes: \*  $p < 0.1$ ; \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ; all significance tests are two-tailed Independent two-sample t-test with unequal variances

The elevated level of freight planning capacity at Florida MPOs when combined with the findings from the case study research suggests that being an MPO in Florida helps explain some variation in freight planning capacity. Revisiting the regression models from Chapter 5 and adding a dummy variable for being in the state of Florida both improves model fit in adjusted R-squared and yields a positive and highly statistically significant coefficient.



Interestingly, the variable measuring geographic centrality becomes statistically significant at the  $P < 0.05$  level in this model likely because it now controls for MPOs in the state of Florida that have high levels of freight planning capacity despite being geographically distant from many of the major population centers in the United States.

Table 6.8 Combined Regression Model from Chapter 5 with Addition of Florida

	Chapter 5 model		Chapter 5 model plus FL	
Population within 500 miles (pct.)	0.489 (0.302)		0.577 (0.277)	**
Area (square miles)	0.034 (0.006)	***	0.033 (0.012)	***
Interstate	0.147 (0.083)	*	0.118 (0.082)	
Intermodal connector	0.179 (0.057)	***	0.156 (0.059)	**
Class 1 railroad	0.137 (0.080)	*	0.180 (0.078)	**
NAAQs non-attainment	0.023 (0.069)		0.060 (0.070)	
MPO full-time staff	0.005 (0.001)	***	0.005 (0.002)	***
Regional freight champion	0.397 (0.066)	***	0.402 (0.060)	***
Florida (dummy)			0.397 (0.110)	***
Constant	-0.700 (0.109)	***	-0.763 (0.108)	***
N	278		278	
R-squared	0.35		0.38	
Adjusted R-squared	0.33		0.36	

Notes: Robust standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$   
 Figures for area are in thousands. Full-time staff excludes freight staff.

## **6.6 Cross-Case Analysis and Discussion**

### *6.6.a Regional Freight Champions and MPO Freight Planning Capacity*

The case study analysis largely supports the predicted pattern between the presence or absence of a regional freight champion and high or low levels of MPO freight planning capacity. The MPO in Grand Rapids is connected to two business organizations and a regional pro-business regime that champion freight transportation issues, helping raise the prominence of goods movement within the MPO. The business groups themselves provide some of the freight planning capacity. The Grand Rapids Area Chamber of Commerce staffs and administers a transportation committee focusing on freight that the MPO actively participates in. That level of MPO participation is a major difference between the transportation committees of the Grand Rapids and Greenville chambers. The Greenville MPO is welcome to participate in the Greenville chamber's committee, but the Greenville MPO represents areas also served by several other chambers. The Greenville committee is also largely focused on passenger transportation issues.

In Grand Rapids, when the MPO developed their most recent LRTP, they created a subcommittee for each of the major areas within the plan, including freight. To create the freight subcommittee and identify participants, the MPO partnered with the economic development organization The Right Place. A similar situation occurred in Greenville during their last LRTP when the South Carolina Trucking Association (SCTA) helped with the effort by distributing a trucking survey. An outside consultant, however, developed the Greenville LRTP, and the work by the SCTA did not create a long-lasting connection between the industry group and the Greenville MPO.

Greenville and Grand Rapids are economically, culturally, and politically the most similar of the four case study regions. The MPOs for the two regions, however, are very different in terms of their freight planning capacity. The presence or absence of a regional freight champion does seem to influence such capacity in both cities but is not the only explanation. The Grand Rapids MPO, housed within a larger regional council of governments, has greater authority and influence than the Greenville MPO. Michigan and South Carolina also have quite different histories in terms of relationships between the state and localities. In Michigan, counties and municipalities have had substantial decision-making authority whereas the state government has retained more of the authority in South Carolina.

Honolulu and Fort Myers provide counterpoints to the expected pattern between the presence or absence of a regional freight champion and high or low MPO freight planning capacity. The analyses of these cases do not yield rival explanations that undermine the central relationship being studied. The case of Fort Myers suggests that state-level policies and efforts may have substantial influence on the activities and capacities of local transportation planning organizations. Florida prioritizes freight planning and also provides benefits in the form of the potential to secure additional funds. The state also directly promotes and offers support for freight planning capacity with the Trade and Logistics Academy being a prominent example. The centrality of freight transportation to the Florida state government and DOT, their bureaucratic restructuring to emphasize goods movement, and incentives for conducting freight planning, presents a model that could be adopted by other states wanting to bolster metropolitan freight planning. Michigan, the home state of the other case with high MPO freight planning capacity, is also very active in freight planning. In the past few years the state has concluded a rail plan, freight plan, and a logistics and trade

plan. To develop the last plan the Michigan governor created a state Logistics and Supply Chain Steering Committee; individuals from the Grand Rapids Area Chamber of Commerce and The Right Place comprised two of the fourteen committee members (Michigan Economic Development Corporation 2012).

The Lee County MPO did not identify a regional freight champion, and they may actually serve that role for the Fort Myers region, but if an external regional freight champion developed then that organization would likely increase the MPO's freight planning capacity. The relatively high level of freight planning capacity at the Lee County MPO stems from the prioritization of freight transportation at the state level and a conscious effort to be more competitive in securing federal and state funds. Having a freight champion within the region would likely make those planning efforts even more competitive because there would be an additional ability to promote the freight needs of Southwestern Florida at the state level in a way similar to how the major business organizations in Grand Rapids have been able to underscore their region's freight transportation issues with state leadership.

The Oahu MPO combines a region with two major ports of entry, a critical freight transportation network, a regional freight champion, and very low MPO freight planning capacity. The low level of freight planning capacity is much more likely the result of low overall organizational capacity at the MPO rather than any direct reflection on freight volumes and a regional freight champion. The joint FHWA / FTA certification report from fall 2014 supports the conclusion of low authority and capacity of the Oahu MPO. If the overall organizational capacity of the MPO were to increase, the long-standing relationship with their identified regional freight champion, the HTA, should be beneficial in expanding freight planning efforts. The proposed study by the Oahu MPO to determine the locations

and destinations for freight flows after trucks depart the Honolulu Harbor would be strengthened by a partnership with the HTA.

The current recertification process in Hawaii is as close as a region can come to a crisis in metropolitan transportation planning as delineated by the federal government. In reference to potential decertification, the head of the Oahu MPO was quoted in a newspaper, “I sort of think ultimately it comes down to [the Federal Highway Administration] and their willingness to enforce their rules. They either have to enforce it or not. Decertification may be the only tool they have” (Cocke 2014).

The case of Honolulu demonstrates how rarely the certification process requires meaningful changes to MPO transportation planning. The Oahu MPO appears to have not been meeting basic elements of TMA responsibilities, such as being a decision-making organization independent of the state DOT, for decades. The Oahu MPO regularly received certification approval from the US DOT until members of the Oahu MPO's staff and policy began publicly advocating for reform. In this case, the certification process proves beneficial for an MPO to have some recourse to impel changes to meet foundational federal requirements, but it is very unlikely that the certification process would mandate improvements specifically related to freight planning capacity.

#### *6.6.b Kent County, Michigan and the Challenges of Long-Range Planning*

In the case study fieldwork and analysis a substantial conflict emerged between the overarching objective of long-range transportation planning and inadequate funding for transportation infrastructure. The following example documents the state of long-range transportation planning in a county road commission and not an MPO, but its lessons are illustrative for the work and functions of MPOs. The Kent County Road Commission in

Michigan is responsible for all of the roads in the county that are not city, state or federal highways. Michigan is a state with a long tradition of home rule, so there is actually a vast county road network. Grand Rapids, Kent County, and West Michigan grapple with tough weather and climatic conditions. The region's proximity to Lake Michigan to the west moderates the overall temperature in the winter and produces more precipitation in the form of snow. The tremendous amount of snow that falls on the region then, because of the higher temperatures, undergoes a fluctuating process known as the "freeze-thaw cycle." This process of freezing, thawing, and then freezing again is very damaging to roads, particularly those in poor condition. The freeze-thaw cycle produces so much damage to the area's roads, often in the form of potholes, that the end-of-winter is commonly known as "pothole season."

The Kent County Road Commission has identified within the county's road system, a series of roads particularly important to freight transportation and the region's economy, known as the "Economic Support Network." The transportation planning body has the goal of transforming the pavement of the entire Economic Support Network to a Class A standard that allows for all-season travel, so that the network can be used by heavy trucks throughout the year. Transforming a Kent County road to a Class A Standard costs between \$1 and \$2 million per mile. With an annual budget of around \$10 million, and plenty of other needs in the form of highway and road repairs, Kent County is able to expand the all-season portion of its Economic Support Network by one or two miles per year. With more than 200 miles of the Economic Support Network needing to be upgraded to an all-season standard, there are enough planned improvements for at least the next century. Even when adopting a shorter time frame, the Kent County Road Commission has already identified the specific segments of road and the year they will be upgraded for the next decade.

The Kent County story is similar at many MPOs. The amount of funding available for transportation projects is limited, especially for anything other than system preservation and maintenance. The time horizon for long-range transportation planning is twenty to twenty-five years. In freight transportation, one common critique is that the planning time frames for an MPO are very different from a private company concerned with today and the near future. Aside from the incongruence between public and private sector planning horizons, it is reasonable question the emphasis on planning for two or three decades in the future when the needs from ten years ago remain unmet.

There is also the real possibility that long-range planning coupled with limited resources and authority to enact those plans lowers the public's confidence in planning and for the effectiveness of planning organizations. The long-range transportation planning process, akin to the process of developing a comprehensive plan, requires extensive public participation. And if the general public participates in plan creation, a plan gets adopted, and very little of the plan gets implemented, then the entire process loses legitimacy.

Long-range transportation planning may also help establish the perception of a rational process that will be able to meet the needs of the region not just today but decades from now. And, in reality, regional infrastructure needs are much more urgent. Again, if we are not meeting the transportation needs from one decade ago then how can we claim to be planning for the infrastructure needs of the future?

#### *6.6.c Future Case Study Examinations*

Findings from the case study analysis in conjunction with this study's sequential mixed-method research design suggest several additional areas of study. One possibility for further examining the relationship between a regional freight champion and MPO freight

planning capacity is to revisit the case study selection criteria and process. Five additional cases met the selection criteria for this study's case study analysis (see Table 6.9).

Table 6.9 Additional Cases Meeting Selection Criteria

	No Champion	Yes Champion
High Capacity	Des Moines, IA	Clearwater, FL Vancouver, WA
Low Capacity	North Haven, CT Vineland, NJ	—

The additional cases are concentrated within the selection matrix of aligning with the expected pattern of relationship between presence of absence of a regional freight champion and level of MPO freight planning capacity. The inclusion of Des Moines, Iowa also provides another counter example to the expected pattern. If an additional series of case studies was conducted using the above selection criteria and the results followed a similar pattern as this found in this study that would strengthen the validity of this study's findings.

From the case of Fort Myers, the role of the state of Florida was noticeable in terms of influencing MPO freight planning. A further examination of Florida MPOs from the survey data demonstrated much higher than average MPO freight planning capacity, especially for medium and large regions, relative to MPOs across the country. Florida is joined by several other states with high average levels of MPO freight planning capacity, notably Ohio and Washington. Ohio has several well-known MPO freight planning programs and is geographically positioned to distribute freight among the major population centers on the eastern seaboard. The state of Washington has less-obvious explanations for their elevated capacity levels. Studies of MPOs in Ohio, Washington, and Florida would provide insight into the influence of state-level policies and efforts on metropolitan freight planning.



## 6.7 Conclusion

The case study analyses support the initial hypothesis that higher levels of MPO freight planning capacity are associated with the presence of a regional freight champion. In the case of Grand Rapids, the freight champion was at the center of a longstanding regional regime of pro-business organizations. While the MPO comprises an organization within this regional regime, it is a supportive organization, at least in terms of freight planning. The emphasis of the regional regime on freight, logistics, and transportation infrastructure has positively influenced the work of the MPO and its freight planning capacity. In contrast, the absence of a regional freight champion in Greenville impedes that organization's capacity to conduct freight planning. The major freight stakeholders work at a higher level in terms of authority and geography. The lack of connection between the Greenville MPO and the major freight stakeholder organizations in South Carolina helps explain the MPO's relatively low level of freight planning capacity.

The disjuncture between regional geographic context and an MPO's freight planning capacity was a surprising finding from the case analyses. Based on economic industries, transportation infrastructure, freight volumes, and geography it would be expected that Honolulu, Greenville, and Grand Rapids would have regional planning organizations with higher levels of freight planning capacity whereas Fort Myers would have an MPO with lower levels of freight planning capacity.

One striking finding from the case studies is the vital role of state-level organizations in influencing MPO freight planning. State DOTs, of course, are central to metropolitan transportation planning which is an intergovernmental process between them and MPOs. However, despite the state objectives of contemporary federal transportation policy that seeks

to more evenly balance the authority between state DOTs and MPOs, the case studies make clear that state DOTs still possess much higher levels of power and authority than MPOs. These findings suggest that state-level organizations, particularly state DOTs, exert substantial influence on an MPO's capacity to conduct freight planning. State-level government and policies may strengthen that capacity as in Florida and to a lesser extent in Michigan. The state-level influence may be negligible as appears to occur in South Carolina. Or the effects of state-level organizations and policies may impede an MPO's freight planning capacity as in Hawaii. Rather than being a collaborative partner on regional freight planning with MPOs, the case studies suggest that state DOTs exert tremendous influence on an MPO's freight planning capacity.

## **7 Conclusion**

The fundamental limitation to overcoming freight mobility challenges is that the public-sector process at the state and local levels for planning and financing transportation improvements is not well suited to address freight projects.

– US General Accounting Office, 2003

### **7.1 Freight, MPO Planning, and the Metropolis**

This study seeks to better understand regional freight planning in the United States and the role of MPOs within these planning efforts. Results from this study show that overall MPO freight planning capacity is low but that substantial variation exists between MPOs. The potential explanations for these variations examined in this study were organized into four categories with an emphasis on the first two: federal policy, multisector regional freight planning, state-level government, and regional geography. Somewhat surprisingly as MPOs exist because of federal legislation, findings from this study indicate that federal policy has minimal impact on MPO freight planning capacity. Geographic context, from the analyses of the national survey and case studies, is also less important than expected. Regional regimes of multisector freight stakeholder organizations were found to positively influence an MPO's capacity for freight planning, although more research in this area is needed because of the small number of cases examined, especially with regard to the connections between champion organizations and regional coalitions. State-level organizations, and state DOTs in particular, appear to have the greatest effect, both positively and negatively, on MPO freight planning capacity.

The conclusion of this study diverges from the contention expressed in the 2003 GAO report that public sector policy and organizations at state and local levels comprise the primary obstacle to addressing the freight transportation challenges in the United States. The fundamental limitation to overcoming freight mobility challenges in the United States is likely that the current public-sector process at the *federal* level for planning and financing transportation improvements is not well suited to address freight challenges.

So what is the role of MPOs in regional freight planning and what should planners be doing? Returning to the case of New York provides a path forward. While the MPOs in metropolitan New York may participate in the planning of a freight connection across the Hudson River, it is unlikely that even these large MPOs will comprise the catalyst for implementing such a large-scale freight project.

There are, however, many aspects of freight transportation and freight planning where MPOs are well-suited to make tangible and important contributions. As bicycling becomes a more prominent mode of urban transportation, there are increasing safety issues as cyclists vie for space on crowded city roads with many vehicles including delivery trucks. Emerging research shows that bicycle and commercial vehicle conflicts are frequent and that the configuration of bicycle lanes in relationship to parking zones seems to influence the rate of conflicts (Conway, Cheng, et al. 2013; Conway, Thuillier, et al. 2013). Another area of research and policy focus is the potential for off-hour delivery to shift truck traffic away from peak hours although significant barriers exist, especially in the form of resistance from receivers (Holguin-Veras 2008). New York City has implemented a pilot incentive program with some success, and it is estimated that if fully instituted such a program could shift 20 percent of truck traffic to non-peak hours with a total annual benefit between \$150 and \$200

million (Holguin-Veras et al. 2011; Holguin-Veras et al. 2014).

#### *7.1.a The Limited Role of MPOs in Metropolitan Freight Planning*

Although federal policy stipulates that planning for freight is a central MPO responsibility, this study confirms and expands on previous research demonstrating that the overall capacity of MPOs to conduct freight planning is relatively low. More than two-thirds of MPOs have no dedicated freight planning employees, staff freight training is minimal, and freight issues commonly occupy a peripheral status within the organizations. The primary freight planning activity performed by most MPOs is incorporating a freight element, often brief, into their long range transportation plan. There are notable exceptions where MPOs have robust freight planning programs that include regional studies and research, active committees of freight stakeholders, community outreach efforts, and even divisions of freight planning. High levels of MPO freight planning capacity are mostly found in the largest MPOs, those representing regions with populations over one million, but these elevated levels are occasionally found in much smaller organizations.

When MPOs do conduct freight planning, the efforts are almost exclusively related to highway modes with heavy trucking being most prevalent. The highway and trucking dominance within MPO planning efforts stems, in part, from historical emphases on automobiles and interstate construction and also from restrictions tied to federal monies from the Highway Trust Fund (HTF). In contrast with passenger transportation where federal dollars generally have more widespread applicability including highway, transit, bicycle, and pedestrian, for freight transportation the HTF funds are primarily limited to highway infrastructure. Of course, road projects may benefit other freight modes such as eliminating at-grade crossings for railroads and improving highway connections to other modes. Without

the ability to program funds to other freight modes, comprehensive multimodal freight planning is challenging if not impossible.

Although MPOs are widely known as regional transportation planning entities, their greatest authority and influence perhaps stems from the intergovernmental process with state DOTs for the programming of transportation projects. Relationships between MPOs and state DOTs vary, but in all cases the process of identifying, prioritizing, and programming projects is supposed to be an intergovernmental collaboration. Compared with other public, quasi-governmental, and private entities that have the ability to generate their own revenue, MPOs must plan for freight and other forms of transportation within a highly constrained fiscal environment. The relative decline in funding available from the federal gasoline tax further diminishes the authority and influence of MPOs.

#### *7.1.b Minimal Effects of Federal Policy*

More than two decades into the ISTEA era, the promises of multimodal transportation planning remain elusive. Considering that MPOs were created by and achieve their legitimacy through the federal government, one of the starkest and most surprising conclusions of this study is the relatively limited impact of federal policy on MPO freight planning capacity.

The categorization of MPOs into two groups based on regional population with different levels of responsibility and authority is frequently cited as a critical policy innovation introduced through the 1991 federal surface transportation legislation (e.g. Dilger 1992, 1998; Goetz, Dempsey, and Larson 2002; Katz, Puentes, and Bernstein 2005; McDowell 2003; Wolf and Farquhar 2005). The findings from this study, both from the national survey and the case studies, suggest that TMA designation has essentially no impact

on increasing an MPO's capacity to conduct freight planning. Suballocation of some STP funds, certification by the FHWA and FTA, and maintaining a congestion management system are all components of TMA designation that do not appear to bolster the planning capacity of TMAs relative to their non-TMA peers.

Since MPOs by federal law must plan for freight transportation, the required certification process in theory provides the opportunity for the FHWA and FTA to substantially advance federal policy objectives. However, MPOs are given considerable discretion in how they fulfill their federal obligations (McDowell 1999). Seemingly, so long as MPOs mention freight transportation in their long-range planning efforts they then comply with federal requirements.

Apart from ISTEA-era transportation legislation, other federal policies and mandates also seem to have minimal influence on MPO freight planning capacity. Regional non-compliance with NAAQS standards carries consequences but tends to not be a primary consideration in MPO freight planning. Because they rely on federal funding, all MPOs must incorporate environmental justice into their planning efforts. Even though a cabinet-level Interagency Working Group on environmental justice specifically identified goods movement as an area of focus in 2011, that federal initiative appears to have had no impact on MPO freight planning.

While the findings from this study suggest that federal policies have no or limited impact on explaining variations in MPO freight planning capacity, federal policies may still affect such capacity on aggregate. As the majority of MPOs have limited or no freight planning programs, it is reasonable to conclude that federal efforts to improve MPO planning capacity for freight and goods movement have largely been unsuccessful.

### *7.1.c The Importance of State Government*

A central finding from this study is that the balance of power between MPOs and state DOTs rests mostly with the state agencies. State DOTs dwarf MPOs in terms of staff, resources, and authority. The North Carolina Department of Transportation (NCDOT) alone employs about 14,000 people (NCDOT 2014). All 381 MPOs in the United States employ less than 5,000 total people.<sup>12</sup> Understandably, a state DOT has much broader responsibilities than MPOs such as road building and maintenance, but the chasm in size is remarkable.

One finding that is clear from this study is that despite federal efforts to bring greater balance between MPOs and state DOTs, the states retain considerably higher levels of authority and have substantial influence on an MPO's capacity to conduct freight planning. Depending on state policies and actions, particularly in regards to the DOT, the state may advance or hinder an MPO's freight planning efforts.

### *7.1.d Freight Champions and Coalitions May Elevate MPO Freight Planning*

Another primary finding from this study is the association between a regional freight champion as well as a regional coalition of freight stakeholders and higher levels of MPO freight planning capacity. This finding was first demonstrated in the quantitative analysis of the national survey of MPO freight planning and then examined in greater detail through the four case studies. The identification by an MPO of a regional freight champion was the strongest, most consistent, and statistically significant predictor of MPO freight planning capacity in the quantitative analysis. The case studies provided empirical support for this relationship.

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<sup>12</sup> The 278 responding MPOs employed 3,195 full-time staff in 2012 when extrapolated to the full population of 381 amounts about 4,500 employees.



### *7.1.e The Less Important Effects of Regional Geography*

Findings from both the quantitative and qualitative analyses suggest that regional geography and regional contexts may be less important than initially hypothesized. Freight volumes are generally highly correlated with regional population so untangling some of those influences is challenging. However, measures of freight intensity and geographic context such as centrality were mostly insignificant in the regression models. The disjuncture between regional context and MPO freight planning was perhaps most conspicuous in the case studies. Honolulu and Greenville, South Carolina with major freight infrastructure had low levels of MPO freight planning capacity whereas the MPO for Fort Myers, Florida possessed extensive experience with freight planning despite few freight facilities and a mostly service-oriented economy. When it comes to MPO freight planning, geography, it seems, is by no means destiny.

### **7.2 Study Contributions**

This study offers multiple contributions to the literatures on urban planning, freight transportation planning and policy, regional governance and political economy.

The national survey of MPOs and their experiences with freight planning was the first such since AMPO in 2003, and this survey elicited much broader participation, more than doubling the number of responding MPOs. Results from this study confirm previous research on the overall low levels of MPO freight planning capacity. Additionally, as described in Chapter 4, the overall capacity for freight planning at MPOs does not appear to have increased markedly in the decade since the 2003 AMPO survey, despite extensive federal attempts to expand such capacity.

The approach to planning capacity in this study offers a more systematic understanding of its constituent parts. Planning capacity is an often used yet little understood concept in the planning literature. This study developed a multi-item measure of planning capacity and also examined the determinants and predictors of planning capacity.

From a methodological perspective, the use of regression discontinuity design to study policy impacts offers the potential for planning researchers to test causal relationships between variables. Because of the nature of complex systems that are the focus of urban planning studies and the inability to manipulate variables, planning research often examines correlational rather than causal relationships between variables. This type of quasi-experimental research design may be useful in future urban and transportation planning studies.

Perhaps the most important contribution of this project is the study of freight transportation planning within an urban planning framework. In order to undertake the study of regional freight planning with a focus on MPOs, this project synthesized literature from many fields including land use and environmental planning, urban theory, planning theory, engineering, political science, and organizational theory. The study of urban and metropolitan freight planning remains in its nascent stages, and the literature review, research design and methods, and findings from this study will hopefully provide foundations for future studies. There remain numerous avenues for future research within this field, and there are seemingly many more unexamined areas within urban and metropolitan freight planning than topics that have received formal research. Avenues for future research are discussed in the following section.

### **7.3 Avenues of Future Research**

Freight transportation has historically been understudied in the urban planning and transportation planning literatures (Chatterjee 2004; Ogden 1992; Woudsma 2001). Freight planning research, especially on issues relating to urban freight, has been increasing in recent years, and there are greater efforts to categorize and synthesize the freight transportation planning literature (e.g. Giuliano et al. 2013). This study builds on and contributes to that freight planning literature, while providing the foundation for further research into freight planning in regards to MPOs, private sector freight planning, the political economy of metropolitan freight planning, federal policy, and state-level freight planning.

The regional freight planning initiative in Grand Rapids, Michigan being conducted by organizations representing private sector interests likely warrants additional examination. Of course, individual companies regularly plan for freight transportation. Sometimes these companies form partnerships to reduce logistics costs. Having two business organizations, however, collect interview and freight flow data from multiple companies and then develop a regional freight study is unique. A follow-up research project comprised of a much more in-depth study of the private sector regional planning efforts in Grand Rapids would increase the understanding how such initiatives function and potentially provide an additional model of regional freight planning with applicability to other metropolitan areas.

A complementary avenue for future research would be an extensive case study of the political economy of metropolitan freight planning. While there are historical studies that focus on freight planning at the regional level, including the roles and relationships between individuals and organizations from multiple sectors (e.g. Doig 1993; Doig 2001; Erie 2004), there has been less work on contemporary metropolitan freight planning. The work of Stone

(1989, 1993) on urban regimes in Atlanta provided some of the theoretical foundation for this study, and a book-length examination on the political economy of metropolitan freight planning in the post-ISTEA era would be a helpful addition to the research literature.

The findings from this study do not suggest many positive implications for federal policy as it pertains to MPO freight planning. If the division of MPOs into two categories based on population remains a central component of federal policy, then there may be benefits for additional research on how TMA designation influences MPO planning. It is feasible that TMA designation affects other planning responsibilities to a much greater extent than freight planning. Transit planning and bicycle / pedestrian planning are areas where TMA designation may be more important. The additional authority granted to those MPOs may allow greater allocation of resources to these non-highway passenger modes relative to state DOTs that have historically been more closely associated with highway and road building.

With the anticipation that future federal legislation may alter the function and responsibility of MPOs, a commonly proposed policy change is to eliminate MPOs that serve regions with fewer than 200,000 people (see Fogel 2012; Frazee 2012; Snyder 2011). In terms of freight planning capacity, this study found an overall positive correlation between regional population and such capacity. However, one striking component of the results from the national survey was a number of small MPOs had very high levels of freight planning capacity. A study of freight planning in these smaller MPOs would be theoretically interesting because their capacity levels diverge substantially from the overall trend. Studying these organizations may also provide policy support for retaining MPOs with

populations under 200,000 because, despite a small size, they have been able to develop a high level of organizational capacity for freight planning.

Lastly, as this study demonstrates that states possess significant ability to influence MPO freight planning, there is potential for research on how federal policy affects freight planning at the state level. The urban planning literature has often focused on the work of MPOs to a much greater extent than state DOTs. One potential reason for this emphasis is the longstanding and pervasive influence of regionalism within urban planning, and MPOs are often seen as one of the few if not only example of widespread regional planning in the United States (see Giuliano 2004). With a prominent finding from this research that there remains a large differential in power and authority between state DOTs and most MPOs, the role of state DOTs in contemporary transportation planning is likely understudied especially in relationship to their importance. This conclusion is supported by Taylor and Schweitzer's contention that "despite their historically central role in transport planning, little research has examined the rationale for planning transport at the state level in the USA" (2005, 501).

#### **7.4 Policy Implications and Recommendations**

More than two decades after ISTEA, the United States is still awaiting the multimodal transportation planning revolution. Transportation planning remains largely segregated by mode. While there have been numerous policy changes to broaden the scope of transportation planning, efforts that have met with some success when it comes to passenger travel, MPO freight planning remains largely focused on highways and automobiles.

##### *7.4.a Unimodal Funding Spurs Unimodal Planning*

For many reasons, the MPO focus on highways and roads is understandable as it parallels the funding structure of federal transportation planning and programming. The

highway trust fund is called the highway trust fund for a reason. The HTF is funded almost exclusively by taxes on highway transportation modes. A unimodal system of funding seems better suited to a unimodal system of planning, at least when it comes to goods movement. There are more widely accepted theoretical and practical reasons for using HTF dollars to fund transit, bicycle, or pedestrian projects. Using HTF dollars to advance rail, seaport, or airport projects would be a much more complicated matter. The typical method where HTF dollars are used to strengthen multimodal freight transportation is by supporting intermodal connectors, which are portions of the highway network that connect to other modes. While these efforts may help improve a multimodal freight transportation system, the emphasis remains with highways.

In the past decade, when there has been a more integrated, multimodal approach to federal transportation planning and funding, those initiatives have stemmed from a source of funding different from the HTF. The TIGER Grant program, which was initially part of the American Recovery and Reinvestment Act (ARRA or the "Stimulus") in 2009, has been funded through the General Fund and not the HTF. Freight transportation projects have fared particularly well with TIGER Grants having been awarded to support railroad, seaport, highway, and intermodal projects.

There is a general consensus that the current approach to federal transportation funding is broken and unsustainable. The HTF is projected to become insolvent in a matter of months and not years. While raising the federal gasoline tax and indexing it to inflation or changing it to a percentage of sales rather than cents per gallon are all reasonable ideas, this is an appropriate time to consider a wider range of potential forms of funding and methods that include multiple modes of transportation. Major trucking and highway groups such as

the American Trucking Association are actively promoting an increase in the federal gasoline tax. While the expanded funding from such an increase is definitely needed, it would continue the federal transportation program centered on highways and automobiles.

If the federal government and other policymakers would like railroads, ships, and pipelines to be primary modes for long-distance freight transportation and trucks to be used for last-mile logistics then federal policy likely needs a broader base of funding than solely relying on the HTF.

#### *7.4.b Federal Policy, Federalism, and Devolution*

Discussions about tradeoffs between raising the federal gasoline tax and combining such an increase with other forms of funding presupposes the willingness and ability of Congress to pass any form of tax increase for transportation and infrastructure. Increased revenue and funding for transportation from Congress and leadership on these issues from the Oval Office seem unlikely. A patchwork of short-term extensions will likely continue for the foreseeable future.

Such dithering seems untenable and irresponsible. If the United States is going to have a federal transportation program then the country may as well fund it. If the United States is not going to adequately fund a federal transportation program then perhaps it should devolve most of these responsibilities to the states. States such as Michigan that see the connection between infrastructure, economics, and the public good may be more willing to act on these matters than the country overall.

#### *7.4.c MPOs in the post-ISTEA Era*

To substantially raise the planning capacity of MPOs, which would directly affect their freight planning capacity, MPOs need more resources for staff, for planning efforts, and

for programming projects. Even with MPOs that have suballocation authority over a portion of surface transportation planning (STP) funds, all monies are still administered by the state DOT.

One potential change in understanding MPOs from both a research and policy perspective is to refine the purpose and activities of MPOs to better suit the reality of their transportation planning efforts. The lofty goals of contemporary, modally integrated regional transportation planning espoused in ISTEA and subsequent legislation almost by default creates expectations for MPOs that most simply cannot achieve. *The Honolulu Star-Advertiser* recently characterized the objectives of the Oahu MPO as "the group tasked with prioritizing the island's major road projects" (Pang 2014). While this description of the MPO's work may seem harsh, perhaps a reconceptualization of MPOs as organizations that primarily work to prioritize the region's major road projects would create a much more realistic set of expectations, at least in terms of their regional freight planning efforts.

#### *7.4.d Is Regional Transportation Planning Still Important Federal Policy?*

Although federally-mandated urban and regional transportation planning is now more than 50 years old, in some ways it is remarkable how little has changed. In the mid-1970s after federal policy required the establishment of MPOs for regions with more than 50,000 people, both the research literature and policymakers focused on increasing the organizational capacity of MPOs to carry out their new responsibilities. In the mid-1990s, both the research literature and policymakers focused on increasing the organizational capacity of MPOs to carry out their new responsibilities stipulated in ISTEA. Now in the mid-2010s both the research literature, including this very study, and policymakers focus on increasing the capacity of MPOs to carry out planning in areas such as freight transportation,



bicycle, and pedestrians that have not traditionally been a central component of their responsibilities.

Perhaps we, including this study, have been asking the wrong question. Studies and efforts that focus on how to increase the planning capacity of MPOs and to better understand variations in MPO planning capacity implicitly assume that the existence of the organizations is in and of itself necessary and beneficial. Perhaps we should ask the question of whether a federal transportation policy that emphasizes urban and metropolitan transportation planning remains worthwhile policy, and is MPO planning the best method to implement such policies?

In many ways MPOs are anachronistic entities, organizations that have survived from a vastly different policy era while other similar organizations have been eliminated. The policymaking environment of the 1970s with its strong emphasis on federally-mandated regionalism would be difficult to recognize today. The federal focus on regionalism from that era was largely a reaction to what some perceived as too much authority resting with the federal and state governments in contrast to urban and metropolitan areas. For transportation planning this was most visibly seen in conflicts regarding the siting of interstates through downtown areas and battles between funding for highways and transit.

As is frequently cited, the relative amount of federal money available for transportation is declining year after year. The entire focus of the federal transportation program has shifted from a system expansion to system maintenance. While most MPOs seem to accomplish as much as they can given available resources, as these resources decline it is reasonable to question whether the importance of MPOs is overstated.

#### *7.4.e Does Long-Range Planning Still Make Sense?*

Although a discussion of the continued existence of MPOs and their role within federal policy should occur, it seems unlikely that a major restructuring of MPOs within the federally-mandated intergovernmental planning framework will transpire in the near future. However, it may be helpful to assess the essential work of MPOs. All MPOs must perform four work activities: a fiscally-constrained long-range transportation plan, a fiscally-constrained list of near-term projects to be program, a work plan and budget for the organization, and a public participation plan. Generally, these work elements are unquestioned, but are all four of these efforts necessary? In particular, should MPOs still conduct long-range transportation planning?

One possibility for restructuring federal transportation policy and metropolitan transportation planning is to vastly shorten planning time horizons. Instead of a twenty-five year long range transportation plan, an MPO could create a two to three year "triage plan" that identifies the most important and immediate transportation needs of the region. A truncated time horizon may help increase the legitimacy of MPO planning efforts because the region's residents will be much more likely to see tangible impacts. Triage planning would also underscore the dire situation of much of the nation's infrastructure and add a much-needed sense of urgency to transportation policy and planning in the United States. The evocative image of a transportation planning organization serving as the region's infrastructure emergency room contrasts sharply with a standard view of endless meetings that may accomplish something decades from now.

As a further incentive to address the immediate transportation and infrastructure challenges, federal policy could allow a region to present a case that it currently has an up-to-

date transportation system without structurally deficient bridges or crippling bottlenecks. If a region proved that it meets today's infrastructure needs then there could be a larger pool of financial and other resources for medium and then long-range planning. Competitiveness between metropolitan regions and states is a largely untapped approach to federal policy. Federal transportation policy currently ensures a mostly equal distribution among states, among regions, and a balance between urban, suburban, and rural areas for matters of political expediency rather than prioritizing forward-thinking transportation planning that improves both regional and national competitiveness.

### **7.5 The Private Sector Case for Public Sector Transportation Planning**

One of the more surprising findings from this study's case study field visits and analyses was vocal support for public sector transportation planning by businesses and organizations representing private sector interests. Chambers of commerce, which are generally non-profit organizations with the aim of supporting and expanding local and regional businesses, have recently been at the forefront of making the case for public sector transportation planning and for pursuing efforts such as increases in gasoline and sales taxes to generate additional revenue for infrastructure. In an era where government typically does not enjoy widespread respect for its role in improving communities and regions, it may seem odd that some of the most vocal champions of government come from business organizations. At the chamber in one of the case study regions, an interviewee succinctly made the case that "transportation is one of the core functions of government" and "the private sector does not repair bridges." Chambers in Honolulu and Grand Rapids signed and sent a letter to Congress in the fall of 2014 advocating for greater federal funding for transportation. The Public Policy Coordinator of the Grand Rapids Area Chamber of

Commerce recently told a Michigan newspaper that "The recipe for a strong network of infrastructure requires stable and adequate funding at all levels of governments" (Grand Rapids Area Chamber of Commerce 2014).

This study began as an examination of metropolitan freight planning based on the theoretical foundation of political economy in general and urban regime theory in particular. In contrast to a common view that public sector planning constitutes an intervention into private market activities, this study expected to find MPOs that focused on freight planning would do so largely because of the influence of companies and business organizations seeking public resources to advance private interests.

The findings from the study complicate such an interventionist understanding between public and private sectors, in either direction. The building of the South Carolina Inland Port may have primarily resulted from decisions made by BMW, but in the other instances of private sector and business interest involvement in freight planning, the overall spirit was much more cooperative and generalized than benefiting one particular group or company.

Business organizations like a chamber may vocally support public infrastructure investment because they represent a wide array of businesses. Increased spending on infrastructure is then seen as a way of improving regional competitiveness, which should benefit most member organizations. For private firms like trucking organizations, general support for infrastructure investment occur because the carriers mostly operate on publicly-financed infrastructure, and it is much more difficult to target a project to benefit one company over another, which can happen in railroad and other freight modes.

Instead of a traditional skepticism and wariness between public and private sectors, contemporary challenges to generate sufficient revenue for effective transportation planning and the provision of infrastructure may benefit from increased collaboration between the sectors. Metropolitan transportation planning, and freight planning in particular, may be substantially improved with an integrated and collaborative approach. The focus on infrastructure by private companies and business organizations provides an opportunity for a broad coalition of stakeholder organizations championing the role of government in providing transportation infrastructure. In contrast to the expectation that private sector interests may be intervening in public sector planning, perhaps the actual story is the business community's vocal defense and promotion of government. Given the general level of antipathy towards government and the public sector in the United States, having the head of a chamber of commerce or trucking firm or manufacturer make the case for increased public spending on infrastructure with concurrent higher taxes will likely gain more traction than a similar proposal made by the head of a planning organization.

## **7.6 The Road, Tracks, Course of Navigation, and Flight Path Ahead**

The paradox and challenges of metropolitan freight planning persist. Although many of the original regional planning efforts in the United States centered on addressing issues to freight transportation, freight planning remains a new area for both researchers and professionals. It would be easy and perhaps even tempting to view the results of this study and largely dismiss MPOs, especially in their role of addressing the massive freight transportation and infrastructure problems confronting the United States in 2015. The difference in magnitude between crumbling infrastructure, a broken system of federal

transportation funding, and threats related to global climate change on one hand and the now-cancelled \$20,000 freight flow study in Honolulu on the other is simply staggering.

Transportation planning, however, operates at multiple scales. And it is unreasonable to expect MPOs with limited funding, authority, and a median staff size of four to address such large-scale issues. Meaningful action on those issues should likely be undertaken by the President and Congress, hence the conclusion of this study that currently the primary freight transportation challenges in the United States result from inadequate federal policies and continuing federal inaction. More-realistic expectations of MPO freight planning are warranted.

Findings from this study underscore a role for many MPOs in regional freight transportation planning, and that is examining the local and regional impacts of freight facilities, infrastructure, and flows. The Greenville MPO and its constituent municipalities may have had a minimal role in the planning and construction of the inland port, but the region will have to grapple with the impact of this facility for some time. In most of the regions studied, there tends to be plenty of work, forethought, and study about specific freight facilities or network segments. There tends to be much less study and understanding of the broader local, regional, and interregional freight transportation system. Taking on the challenge of these more system-wide issues is an area where MPOs could contribute significantly.

And they might not have to do that system-wide research, planning, and analysis on their own. Looking back to the planning before World War II offers models where the public sector does not have the primary responsibility for regional planning. These efforts may be better suited to civic or business organizations. At the current time, the most persuasive

arguments for increased spending on transportation infrastructure are emerging from groups representing private industry. Public sector organizations like MPOs may be better suited to having a supportive role. The first decades of the twenty-first century, at least in terms of regional freight planning, may very well resemble the first decades of the last century.

## **Appendix A Scope of the Metropolitan Planning Process**

23 C.F.R. 450.306 (2014)

(a) The metropolitan transportation planning process shall be continuous, cooperative, and comprehensive, and provide for consideration and implementation of projects, strategies, and services that will address the following factors:

- (1) Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;
- (2) Increase the safety of the transportation system for motorized and non-motorized users;
- (3) Increase the security of the transportation system for motorized and non-motorized users;
- (4) Increase accessibility and mobility of people and freight;
- (5) Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;
- (6) Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;
- (7) Promote efficient system management and operation; and
- (8) Emphasize the preservation of the existing transportation system.



## Appendix B Survey Instrument

### National Freight Planning Study

Note: the actual instrument was administered on the Internet via Qualtrics

Understanding that Metropolitan Planning Organizations (MPOs) undertake many transportation planning efforts, we will begin by asking about the main issues facing the freight transportation system in your region. We will then ask about the primary motivations to undertake freight planning.

Q1 – What are the main freight transportation issues in your MPO’s region? (check all that apply)

- ☐ Highway congestion
- ☐ Railroad congestion
- ☐ Port / waterway congestion
- ☐ Airport congestion
- ☐ Infrastructure maintenance
- ☐ Lack of freight volumes
- ☐ Local delivery
- ☐ Intermodal connections
- ☐ Port / waterway dredging
- ☐ Lack of freight infrastructure
- ☐ Other – please specify \_\_\_\_\_
- ☐ Other – please specify \_\_\_\_\_
  
- ☐ There are no important freight transportation issues in this region

Q2 – Of the issues that you indicated, what is the **most important** issue facing the freight transportation system in your MPO’s region? (select one)

- ☐ Highway congestion
- ☐ Railroad congestion
- ☐ Port / waterway congestion
- ☐ Airport congestion
- ☐ Infrastructure maintenance
- ☐ Lack of freight volumes
- ☐ Local delivery
- ☐ Intermodal connections
- ☐ Port / waterway dredging
- ☐ Lack of freight infrastructure
- ☐ Other – please specify \_\_\_\_\_
- ☐ Other – please specify \_\_\_\_\_
  
- ☐ There are no important freight transportation issues in this region

Q3 – What are the main motivations for conducting freight transportation planning in your MPO’s region? (select all that apply)

- ☐ Air quality
- ☐ Economic development
- ☐ Freight mobility
- ☐ Land use
- ☐ Regulatory requirements
- ☐ Safety and security
- ☐ Other – please specify \_\_\_\_\_
- ☐ Other – please specify \_\_\_\_\_

☐ There are no important motivations for conducting freight transportation planning in this MPO’s region

Q4 – Of the motivations you indicated, what is the **most important** motivation for conducting freight planning in your MPO’s region? (select one)

- ☐ Air quality
- ☐ Economic development
- ☐ Freight mobility
- ☐ Land use
- ☐ Regulatory requirements
- ☐ Safety and security
- ☐ Other – please specify \_\_\_\_\_
- ☐ Other – please specify \_\_\_\_\_

☐ There are no important motivations for conducting freight transportation planning in this MPO’s region

Now that we've learned about the main freight transportation issues in your region, we'd like to learn more about the characteristics of your Metropolitan Planning Organization.

Q5 – What best describes your MPO organizational structure?

- ☐ Independent organization
- ☐ Part of a regional council / council of governments
- ☐ Part of a county government office
- ☐ Part of a city government office
- ☐ Part of a state department of transportation
- ☐ Other – please specify \_\_\_\_\_

Q6 – Is your MPO designated as a transportation management area (TMA)? – TMAs typically represent urbanized areas with a population larger than 200,000

- ☐ Yes
- ☐ No

Q7 – How many paid employees are on your MPO's staff? (enter numbers)

Full-time MPO staff \_\_\_\_\_

Part-time MPO staff \_\_\_\_\_

Q8 – About how many full-time staff (or full-time staff equivalents) does your MPO have dedicated to freight? (enter number) \_\_\_\_\_

Q9 – Since January 1, 2010 have any staff members taken a freight or a freight-related course at the National Highway Institute?

- ☐ Yes
- ☐ No

Q10 – Since January 1, 2010 have any staff members had another form of freight or freight-related training?

- ☐ Yes (please enter name or type of training) \_\_\_\_\_
- ☐ No

Next, we would like to find out about your MPO's relationships with other organizations.

Q11 – Do freight interests have representation on your MPO's policy board?

- ☐ Yes, freight interests have voting representation
- ☐ Yes, freight interests have non-voting representation
- ☐ No
  
- ☐ This MPO does not have a policy board

Q11.1 – Do freight interests have representation on your MPO's governing board?

- ☐ Yes, freight interests have voting representation
- ☐ Yes, freight interests have non-voting representation
- ☐ No
  
- ☐ This MPO does not have a governing board

Q12 – Is your MPO a member of a freight advisory committee or freight task force in your area?

- ☐ Yes
- ☐ No

Q12.1 – If yes, who is the host organization for the freight advisory committee or freight task force?

- ☐ Your MPO

- ☐ Other MPO
- ☐ State department of transportation (state DOT)
- ☐ Private freight company (carrier / shipper / other)
- ☐ Business organization (e.g. chamber of commerce)
- ☐ University or other educational institution
- ☐ Other

Q13 – What organization(s) do your MPO look to for guidance on freight issues? (select all that apply)

- ☐ US Department of Transportation
- ☐ State DOT
- ☐ Private freight companies (carrier or shipper)
- ☐ Business organization (e.g. chamber of commerce)
- ☐ Consultant
- ☐ University
- ☐ Port authority
- ☐ Data vendor
- ☐ Other
- ☐ None of the above

Q14 – How often or not does your MPO communicate with the state DOT on freight issues?

- ☐ Weekly
- ☐ Monthly
- ☐ Annually
- ☐ Less than once per year
- ☐ Never

Q15 – How often or not does your MPO communicate with a local chamber of commerce on freight issues?

- ☐ Weekly
- ☐ Monthly
- ☐ Annually
- ☐ Less than once per year
- ☐ Never

Q16 – Is there a prominent “freight champion” in your region? This could be an organization or an individual

- ☐ Yes
- ☐ No

Q16.1 – If yes, what is the name of the organization or the individual and his or her affiliation?

Name of organization \_\_\_\_\_  
 Name of individual \_\_\_\_\_

Many different approaches are available to MPOs when it comes to technical aspects of planning. For example, some MPOs use transportation models developed by outside organizations while others collect their own transportation data. We'd like to find out about your MPO's experience with data collection, modeling and plan creation.

Q17 – Since January 1, 2005 has your MPO collected data on any of the following freight / non-passenger modes? (select all that apply)

- ☐ Commercial vehicle (e.g. delivery, lawn care, cable repair)
- ☐ Heavy truck (e.g. tractor trailer, regional / interstate freight)
- ☐ Rail
- ☐ Aviation
- ☐ Marine
- ☐ Pipeline
- ☐ None of the above

Q18 – Since January 1, 2005 has your MPO purchased freight data? (e.g. Transearch)

- ☐ Yes
- ☐ No

Q19 – To what extent are freight activities incorporated into your region's travel demand model?

- ☐ High extent
- ☐ Moderate extent
- ☐ Low extent
- ☐ Not at all
- ☐ There is no travel demand model for this region

Q19.1 – What freight modes are included in the travel demand model? (select all that apply)

- ☐ Commercial vehicle (e.g. delivery, lawn care, cable repair)
- ☐ Heavy truck (e.g. tractor trailer, regional / interstate freight)
- ☐ Rail
- ☐ Aviation
- ☐ Marine
- ☐ Pipeline
- ☐ None of the above

Q20 – Which agency performs most of the travel forecasts for your MPO’s long range plan?

- ☐ MPO (e.g. in-house)
- ☐ State DOT
- ☐ Consultants or other contractors
- ☐ Other regional planning body
- ☐ Regional or local transit agency
- ☐ Other agency
- ☐ Not applicable
- ☐ Don’t know

Q21 – Does this MPO use the Freight Analysis Framework (FAF) from the Federal Highway Administration in its transportation planning activities?

- ☐ Yes
- ☐ No

Q22 – To what extent is freight transportation incorporated into your MPO’s most recent long range transportation plan?

- ☐ High extent
- ☐ Moderate extent
- ☐ Low extent
- ☐ Not at all

Q23 – Since January 1, 2005 has your MPO created or been involved in the creation of a stand-alone freight plan for your region?

- ☐ Yes
- ☐ No

Q24 – Since January 1, 2005 has your MPO been involved in a regional freight study?

- ☐ Yes
- ☐ No

Given the wide range of transportation planning activities that MPOs perform, funding is a central issue for many MPOs. We’d like to learn about your MPO’s experiences with funding.

Q25 – Are Surface Transportation Program (STP) funds suballocated to your MPO by the state DOT? (this could be partial to full suballocation)

- ☐ Yes, they are fully suballocated
- ☐ Yes, they are partially suballocated
- ☐ No

Q25.1 – If yes, since January 1, 2010 have any of the suballocated STP funds been spent on freight transportation planning or freight transportation projects?

- ☐ Yes
- ☐ No

Q26 – For the current fiscal year, how much transportation planning funding did your MPO receive from federal sources? This transportation planning funding typically comes from metropolitan planning (PL) and Federal Transit Administration (FTA) funds.

Amount of transportation planning funding from federal sources \_\_\_\_\_

- ☐ Decline to answer
- ☐ Don't know

Concluding questions: Before this survey ends we would like to hear about your MPO's overall opinions about freight in your region. We realize that MPOs balance many transportation planning requirements across many modes. Please keep in mind freight transportation relative to other transportation modes while answering the following questions.

Q27 – How important or not is freight transportation to the member governments of your MPO?

- ☐ Very important
- ☐ Important
- ☐ Moderately important
- ☐ Slightly important
- ☐ Unimportant

Q28 – How important or not is freight transportation to the work of your MPO?

- ☐ Very important
- ☐ Important
- ☐ Moderately important
- ☐ Slightly important
- ☐ Unimportant

Q29 – Is there an active group of freight transportation stakeholders in this region?

- ☐ Yes
- ☐ No
- ☐ Don't know

Q30 – Which of the following statements best describes freight transportation resources at your MPO?

- ☐ This MPO needs a lot more freight resources
- ☐ This MPO needs somewhat more freight resources
- ☐ This MPO has the appropriate amount of freight resources
- ☐ This MPO has too many freight resources

Q31 – For your MPO’s region, how similar or different are passenger transportation needs from freight transportation needs?

- ☐ Very similar
- ☐ Somewhat similar
- ☐ Neutral
- ☐ Somewhat different
- ☐ Very different

Q32 – For your MPO’s region, how helpful or not are passenger transportation improvements for freight transportation?

- ☐ Very helpful
- ☐ Somewhat helpful
- ☐ Neutral
- ☐ Somewhat unhelpful
- ☐ Very unhelpful

Q33 – How important is freight transportation to the state Department of Transportation(s) in which your MPO is located?

- ☐ Very important
- ☐ Important
- ☐ Moderately important
- ☐ Slightly important
- ☐ Unimportant

Before the survey is completed, we would like to learn a little about the person filling out the survey. These two questions are for informational purposes only and will in no way be used to identify the individual completing the survey.

Q34 – What is the title of your position at the MPO?

- Title \_\_\_\_\_
- ☐ Decline to answer

Q35 – How many years have you been an employee of this MPO?

- Years \_\_\_\_\_
- ☐ Decline to answer

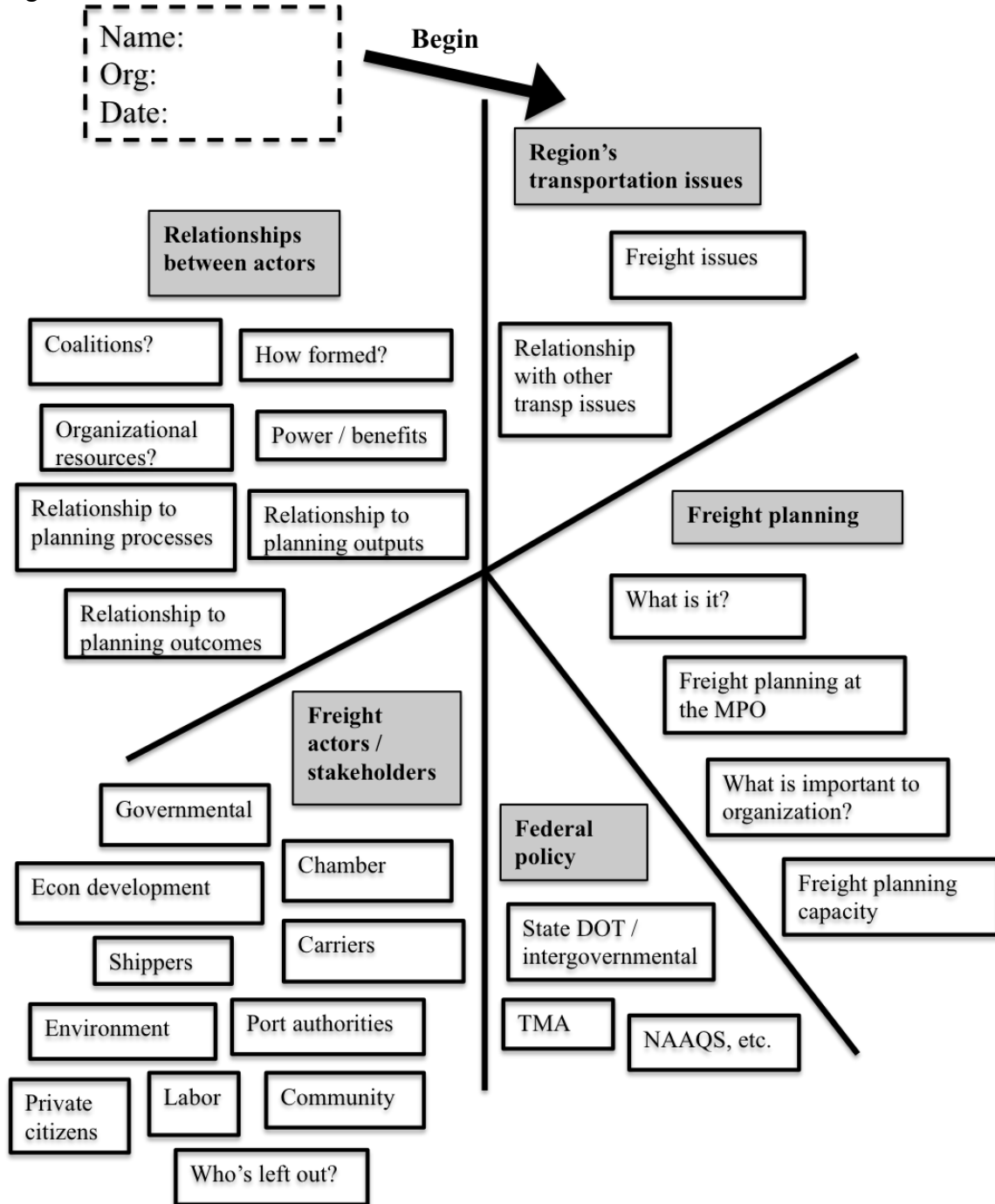


Q36 – If you would like to make any additional comments on freight transportation or freight transportation planning in your MPO’s region (including opportunities or barriers), please do so below.

Additional comments:

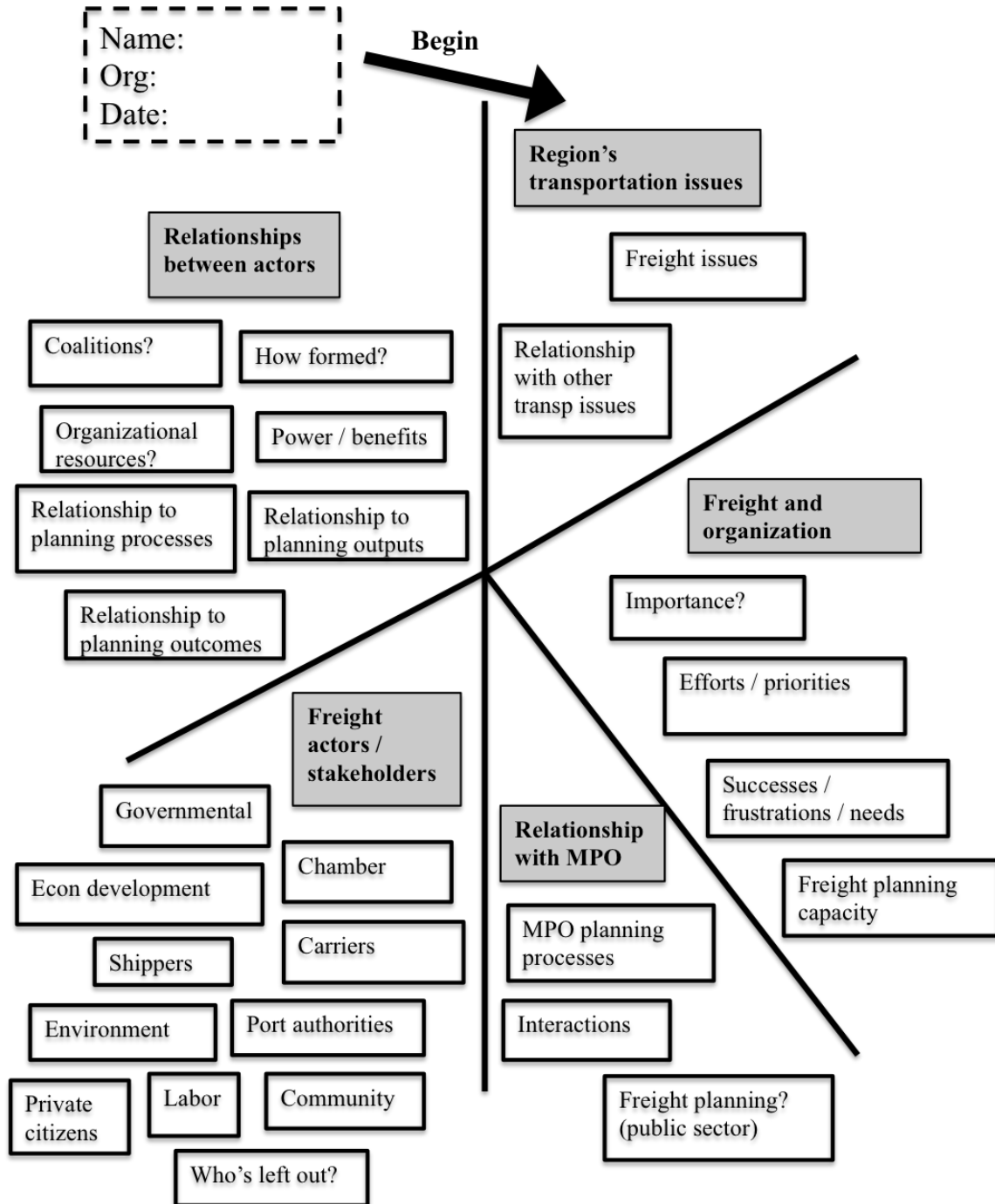
## Appendix C Interview A-Schemes<sup>13</sup>

Figure C.1 Interview A-Scheme for MPOs



<sup>13</sup> For more information on A-scheme development and use in field interviews see Aspers (2004, 2009)

Figure C.2 Interview A-Scheme for Other Organizations



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